Cisco PGW 2200 Softswitch Release 9.8 Operations, Maintenance, and Troubleshooting Guide

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Preface

Revised: March 7, 2011, OL-0800-14

This preface describes the objectives of this document and explains how to find additional information on related products and services. It contains the following sections:

- Document Objectives, page xvii
- Audience, page xvii
- Related Documentation, page xvii
- Obtaining Documentation and Submitting a Service Request, page xviii
- Document Change History, page xviii

Document Objectives

This document provides instructions for operating, maintaining, and troubleshooting the core elements of the Cisco PGW 2200 Softswitch platform.

This document covers systems operation and management, signaling channel operation, alarm management, and problem identification and resolution. Unless otherwise specified, use the procedures in this document when your Cisco PGW 2200 Softswitch platform is configured with two Cisco PGW 2200 Softswitches to work in continuous service mode.

Audience

The audience for this document are network operators and administrators. This audience are assumed to have experience in telecommunications networks, protocols, and equipment. They must also be familiar with data communications networks, protocols, and equipment.

Related Documentation

This document contains information that is related to Cisco PGW 2200 Softswitch operations, maintenance, and troubleshooting procedures. For additional information on those subjects, see the documents at:

http://www.cisco.com/en/US/products/hw/vcallcon/ps2027/tsd_products_support_series_home.html

You can also find the *Cisco PGW 2200 Softswitch Documentation Map* at the following URL:

http://www.cisco.com/en/US/products/hw/vcallcon/ps2027/products_documentation_roadmaps_list.html

Other useful reference publications include:

- Overviews of the related telephony solutions—Describe the Cisco telephony solutions with which the Cisco PGW 2200 Softswitch node is associated.
- Provisioning guides for the related telephony solutions—Describe the provisioning steps for the Cisco telephony solutions with which the Cisco PGW 2200 Softswitch node is associated.
- Solution gateway installation and configuration guides—Describe the steps for installing and configuring the media gateway for a particular Cisco telephony solution.
- *Cisco IP Transfer Point–LinkExtender*—Describes the Cisco IP Transfer Point–LinkExtender (Cisco IPT-L, formerly known as the Cisco Signaling Link Terminal or Cisco SLT) and provides configuration information.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly version of the document *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation at:

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Document Change History

Release Number	Document Number	Change Date	Change Summary
9.8(1)	OL-0800-14	March 2011	Updated hardware platform information in Chapter 5.
9.8(1)	OL-0800-13	April 2010	Deleted two former chapters: • Former Chapter 6 provided information about Cisco routers that supported operation of the Cisco IP Transfer Point—LinkExtender (ITP-L). The documented routers are no longer sold. The document now includes references to routers that currently support the Cisco ITP-L product. • Former Chapter 7 provided information about the Cisco Catalyst 5500 Multiswitch Router. That product is no longer sold. • Modified the description of the operation of disk monitor in Chapter 3 on pages 3-24 and 3-25.
9.8(1)	OL-0800-12	December 2009	Added new information to the section "Managing Bearer Channels" in Chapter 3.

Release Number	Document Number	Change Date	Change Summary
9.8(1)	OL-0800-11	March 7, 2011	Corrected the description of the CallSuccess counter in Appendix D "Cisco PGW 2200 Softswitch Measurements."
9.8(1)	OL-0800-10	December 2008	Added new Cisco PGW 2200 Softswitch measurements in Release 9.8.
9.7(3)	OL-0800-09	May 2008	Updated Cisco PGW 2200 Softswitch troubleshooting MML commands and system output in Release 9.7. Added Cisco PGW 2200 Softswitch call trace enhancement in Release 9.7 Patch 8.
9.7(3)	OL-0800-08	March 2008	Added new Cisco PGW 2200 Softswitch measurements in Release 9.7 Patch 13.
9.7(3)	OL-0800-07	October 2007	Added new Cisco PGW 2200 Softswitch measurements in Release 9.5, 9.6 and 9.7.

CHAPTER 1

Cisco PGW 2200 Softswitch Platform Overview

Revised: March 7, 2011, OL-0800-14

This chapter describes the components of the Cisco PGW 2200 Softswitch platform and presents the software architecture of the Cisco PGW 2200 Softswitch, Release 9.

This chapter includes the following sections:

- Cisco PGW 2200 Softswitch Platform, page 1-1
- Cisco PGW 2200 Softswitch Software Architecture, page 1-4
- Cisco PGW 2200 Softswitch Software Directory Structure, page 1-11

Cisco PGW 2200 Softswitch Platform

The following subsections describe the components of the Cisco PGW 2200 Softswitch platform:

- Cisco PGW 2200 Softswitch, page 1-1
- Cisco SS7 Interfaces, page 1-2
- Cisco Switches, page 1-2

There are several optional elements of the Cisco PGW 2200 Softswitch platform, which are listed in the "Agent Management Subsystem" section on page 1-7. For more information on these optional elements, see the documentation for each element.

Cisco PGW 2200 Softswitch

The Cisco PGW 2200 Softswitch is a Sun UNIX box running Cisco PGW 2200 Softswitch software Release 9. The Cisco PGW 2200 Softswitch performs real-time, call-processing, and SS7-layer functions; manages trunk resources, alarms, and call routing; and administers billing information.

Cisco PGW 2200 Softswitch functionality includes:

- Processing calls
- Originating call detail records (CDRs)
- Providing alarm initiation information
- Producing operational peg counts
- Receiving and processing craft user interface (CUI) data

- Providing Message Transfer Part (MTP) Level 3 (MTP3) functions
- Providing advanced intelligent network (AIN) capabilities

Sun UNIX Hosts

The *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide* identifies the Sun UNIX hosts that support the releases of the Cisco PGW 2200 Softswitch software.

To attain continuous service and reliability, install and configure two Sun UNIX hosts for system redundancy. The call-processing application is active on one Cisco PGW 2200 Softswitch and automatically switches to the standby Cisco PGW 2200 Softswitch only if the active host goes out of service.

Cisco SS7 Interfaces

The Cisco PGW 2200 Softswitch platform interfaces to an SS7 network through Cisco IP Transfer Point LinkExtenders (ITP-Ls) or Cisco IP Transfer Points (ITPs).

Cisco ITP-Ls

The Cisco ITP-Ls terminate Message Transfer Part (MTP) levels 1 and 2 of the SS7 protocol.

Cisco routers, for example, the Cisco 2800, backhaul the remaining SS7 layers by running the Reliable User Datagram Protocol (RUDP) over an Ethernet 10BASE-T or 100BASE-T interface.

The number of signaling network connections available on each Cisco ITP-L depends on the router you install in the chassis. You can use multiple Cisco ITP-Ls (up to 16 per Cisco PGW 2200 Softswitch platform) to support signaling channels. You can configure the Cisco ITP-L with redundant connections to the control signaling network. Redundant connections eliminate the Cisco ITP-L as a possible single point of failure in the Cisco PGW 2200 Softswitch platform. The Cisco ITP-L supports V.35, T1, and E1 interfaces to the SS7 network.

Cisco ITPs

The Cisco ITPs terminate all levels of MTP and the Service Connection Control Part (SCCP) layer of the SS7 protocol. The Cisco ITP backhauls the remaining SS7 layers across an IP network to the Cisco PGW 2200 Softswitch. The Cisco ITP transmits data that conforms to the SIGTRAN standards and MTP Level 3 User Adaptation (M3UA/SUA). The transmissions also comply with the Stream Control Transmission Protocol (SCTP) and pass through an Ethernet interface.

The number of signaling network connections on each Cisco ITP depends on the router you use. Refer to the Release Notes pertaining to the Cisco ITP software for a list of the routers that support the Cisco ITP and the potential number of signaling network connections.

Cisco Switches

Cisco switches provide the Ethernet backbone for the Cisco PGW 2200 Softswitch platform. You can deploy LAN and WAN implementations. See the Release Notes pertaining to the Cisco PGW 2200 Softswitch software for a list of the Cisco switches that should be selected to form the Ethernet backbone.

Table 1-1 shows the limitations of the WAN implementations.

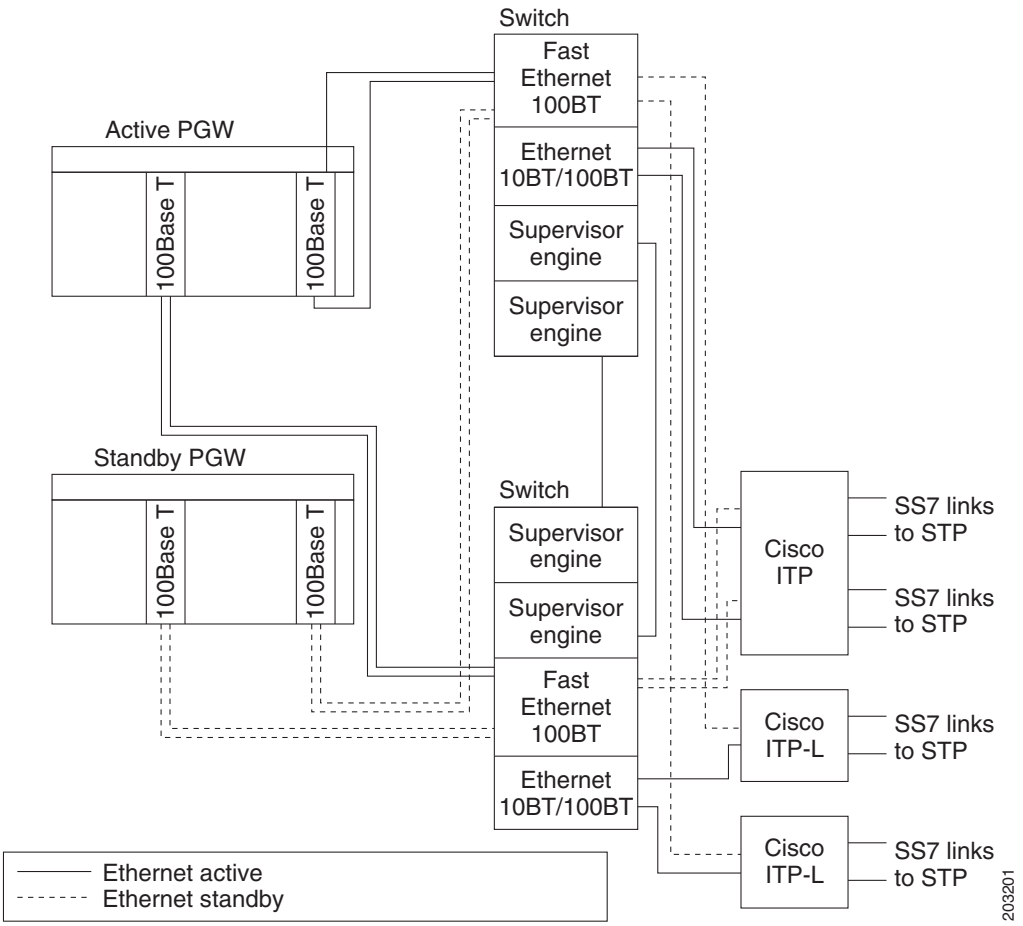
Table 1-1 Limitations on WAN Switches Within a Cisco PGW 2200 Softswitch Platform

Condition	Requirement
Software release version	Cisco PGW 2200 Softswitch software 9.3(2) or later (with associated operating system and hardware requirements).
Total end-to-end delay, one way (the time required to send a message from a source to a destination, such as from a Cisco PGW 2200 Softswitch to a Cisco ITP-L)	Must be less than 150 milliseconds.
Packet loss (defined as missing packets with a message)	Must not exceed 1 percent (preferably, less than 0.5 percent). **Note** For packet loss rates below 0.5 percent, increase the RUDP receive window size (*. rudpWindowSz) to 64 to improve performance.
Dual-VLAN SIP automatic switchover support is enabled	Both Cisco PGW 2200 Softswitches should be part of the same IP subnet.

Ethernet Connections

Each Ethernet NIC for each Cisco PGW 2200 Softswitch is connected to a switch through a 100BASE-T interface. The switches connect to the SS7 interfaces through 10BASE-T or 100BASE-T interfaces. Figure 1-1 displays the Ethernet connections between the elements of the Cisco PGW 2200 Softswitch platform.

Figure 1-1 Cisco PGW 2200 Softswitch Platform Connectivity

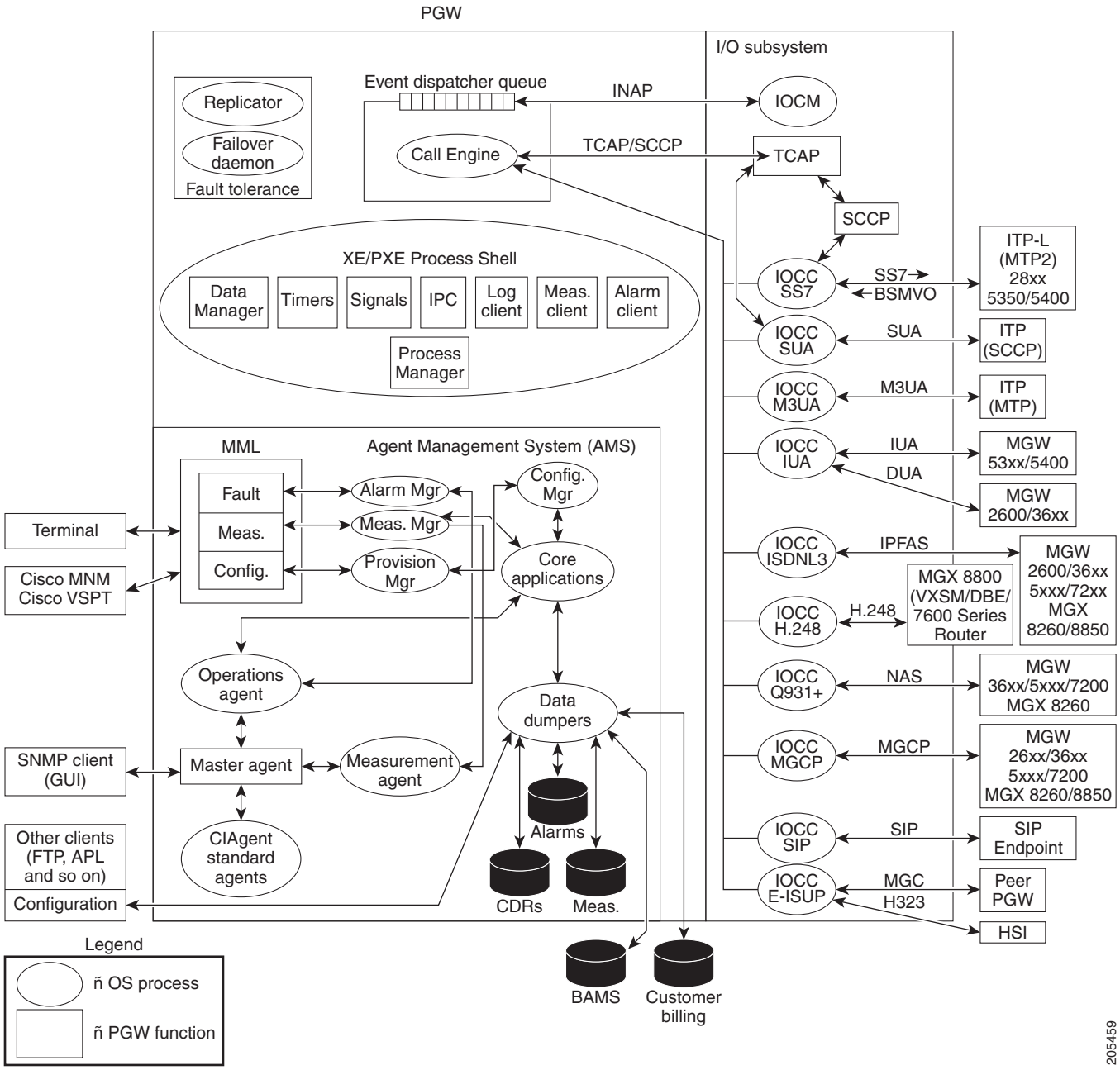


Cisco PGW 2200 Softswitch Software Architecture

This section describes the major subsystems in the Cisco PGW 2200 Softswitch software, which are illustrated in Figure 1-2. The major subsystems are:

- Input/Output Subsystem, page 1-6
- Agent Management Subsystem, page 1-7
- Fault Tolerance Subsystem, page 1-8
- Execution Environment Process Shell, page 1-9
- Call Engine Process, page 1-9

Figure 1-2 Cisco PGW 2200 Softswitch Software System Diagram



Note The H.248 IOCC in the I/O subsystem (in Figure 1-2) became available in Cisco PGW 2200 Softswitch software Release 9.7(3) Patch 8.

Input/Output Subsystem

The I/O subsystem consists of the I/O channel controllers (IOCC) and the I/O channel manager (IOCM), which manages the controllers.

- IOCM manages all IOCCs.
- IOCCs provide:
  - Protocol-specific, message-based interface that allows nodes and platforms that are external to the Cisco PGW 2200 Softswitch to communicate with the Cisco PGW 2200 Softswitch.
  - Interface that allows buffering of messages to the call engine event dispatcher queue.
- The Cisco PGW 2200 Softswitch software I/O subsystem includes the following IOCCs:
  - Basic Rate Interface (BRI)—Added in Release 9.5, this IOCC enables the backhaul of Layer 3 QSIG and Q.931 messages in a TCP session. This IOCC operates between a Cisco PGW 2200 Softswitch and voice gateways that support BRI signaling backhaul.
  - Digital Private Network Signaling System (DPNSS)—Added in Release 9.4, this IOCC enables the transparent transport of DPNSS data over IP. This IOCC operates between media gateways that support DPNSS.
  - Extended ISDN User Part (E-ISUP)—Protocol proprietary to Cisco that enables the transport of endpoint information and media-gateway-specific information between two (or more) Cisco PGW 2200 Softswitches. This protocol provides an enhanced ISUP base to support all ANSI and ITU ISUP messaging and elements. It also has additional fields to support the transport of service information (such as local number portability [LNP], 800 numbers, and so on).
  - ISDN Level 3—Provides backhauling of ISDN (standard variants) from a media gateway to a Cisco PGW 2200 Softswitch.
  - ISDN Q.921 User Adaptation Layer (IUA)—Added in Release 9.4, this IOCC enables backhauling of ISDN Q.921 user messages over IP with the Stream Controlled Transmission Protocol (SCTP). This IOCC operates between a Cisco PGW 2200 Softswitch and media gateways.
  - Media Gateway Control Protocol (MGCP)—Enables communication with media gateways and trunking gateways. This protocol enables you to set up and configure bearer channel connections on the Cisco PGW 2200 Softswitch for call control environments.
  - Message Transfer Part Level 3 (MTP3) User Adaptation (M3UA)—Added in Release 9.4, this IOCC enables the transport of any SS7 MTP Level 3 User signaling (for example, ISUP and TUP messages) over IP with SCTP. This IOCC operates between a Cisco PGW 2200 Softswitch and a Cisco IP Transfer Point (ITP).
  - Q.931+—A stateless IOCC, for a protocol proprietary to Cisco, which is a special version of ISDN that enables forward hauling of Q931+ signaling to a media gateway. You configure this IOCC on a Cisco PGW 2200 Softswitch for signaling environments.
  - Session Initiation Protocol (SIP)—Enables the Cisco PGW 2200 Softswitch to receive and send SIP messages over the User Datagram Protocol (UDP).
  - Signaling Control Connection Part (SCCP) User Adaptation (SUA)—Added in Release 9.4, this IOCC enables the transport of any SCCP user signaling (for example, TCAP messages) over IP with SCTP. This IOCC operates between a Cisco PGW 2200 Softswitch and a Cisco ITP.
  - Signaling System 7 (SS7)—Contains MTP3, which backhauls SS7 signaling from a Cisco IP Transfer Point LinkExtender (ITP-L) to the Cisco PGW 2200 Softswitch.

Agent Management Subsystem

The agent management subsystem (AMS) allows external client software or terminals to gain access to the data in the Cisco PGW 2200 Softswitch. This subsystem supports the following functions:

- Configuration management—Enables you to add, delete, or modify parameters and resources on the Cisco PGW 200 Softswitch so that it can perform its switching function. This data is stored locally in data (.dat) files. This data is required to automate reconfiguration after a process failure.
- Alarm management—Reports and clears alarms generated by Cisco PGW 2200 Softswitch processes.
- Performance measurement management—Reports and clears metrics that are generated by Cisco PGW 2200 Softswitch processes. You can also define thresholds which, if exceeded, could produce alarms.
- Accounting management—Dumps generated CDRs to locally persistent files or to remote databases through a standard or customized API.

The following types of external clients can access or manipulate data on the Cisco PGW 2200 Softswitch:

- Man-Machine Language (MML) terminal—Serves as a command-line interpreter. An operator can issue commands to manipulate data for fault detection, measurements, or configuration. MML is similar to TL/1, which enables low-level system experts (such as operations personnel) to perform rapid system configuration or troubleshooting.
- SNMP-based terminal—Enables you to use SNMP to access network data. You can use the data to manage system performance, to collect measurements, and to maintain security. The Cisco PGW 2200 Softswitch has a master agent (EMANATE from SNMP Research), which includes the following subagents that provide SNMP access to the system:
  - Operations—Custom subagent that provides access to fault data.
  - Measurement—Custom subagent that provides access to measurement data.
  - Critical application monitor—Standard CIAgent subagent that monitors the process manager (procM) process.
  - Host resources MIB—Standard CIAgent subagent that accesses data, such as the number of processors, and memory usage in the Cisco PGW 2200 Softswitch.
  - MIB-II—Standard CIAgent subagent that partially supports the MIB-II standard (RFC-1213).
  - File system monitor—Standard CIAgent subagent that monitors thresholds for five file systems.
- TIBCO management system—Introduced in Release 9.5(2), the Cisco PGW 2200 Softswitch TIBCO interface enables you to use a TIBCO management system to add, modify, delete, and retrieve provisioning data on the Cisco Cisco PGW 2200 Softswitch. The Cisco PGW 2200 Softswitch supports TIBCO Version 6 daemons and libraries. When this interface is enabled, the Cisco PGW 2200 Softswitch can communicate with one of two TIBCO daemons on your management system:
  - Rendezvous Daemon (RVD)—Used when the management system is in the same network as the Cisco PGW 2200 Softswitch. The TIBCO adapter on the Cisco PGW 2200 Softswitch automatically starts RVD on the management system unless either the RVD or Routing Daemon (RVRD) is already running.

  - Rendezvous Routing Daemon (RVRD)—Used when the management system and the Cisco PGW 2200 Softswitches are not on the same network. You must configure the RVRD routing table and start RVRD manually before activating the interface on the Cisco PGW 2200 Softswitch. See the TIBCO user documentation for information on configuring the RVRD routing table.

Note Typically, you activate the TIBCO interface during initial installation or during an upgrade. For more information on activating the TIBCO interface, see *Cisco PGW 2200 Softswitch Software Release 9 Installation and Configuration Guide*.

- Cisco MGC Node Manager (MNM)—Optional application for network element management.
- Cisco Voice Services Provisioning Tool (VSPT)—Optional application for provisioning the Cisco PGW 2200 Softswitch.
- Billing and Measurements Server (BAMS)—Optional application for collecting CDRs and operational measurements.
- H.323 Signaling Interface (HSI)—Optional application that provides an interface to H.323 networks.

Fault Tolerance Subsystem

The fault tolerance subsystem exists to preserve calls if the Cisco PGW 2200 Softswitch encounters a fault condition. There are two processes that ensure this:

- Switchover daemon—Monitors Cisco PGW 2200 Softswitch processes by using a heartbeat mechanism. If the switchover daemon receives no response to its process polling in a fault-tolerant hardware configuration, the control transfers to the standby unit.
- Replicator—Allows processes to checkpoint critical call information, such as signaling and bearer states, as well as call data across the active and standby processors. The replicator duplicates enough information to enable established calls to survive a switchover. Checkpointing events are generated at two points in a call:
  - When the call is answered, to update the full duplex path.
  - When the call is released, after the physical resources are de-allocated.

  An operator who is performing maintenance by issuing MML commands using an SNMP client, or by circuit supervision, can generate connectionless (noncall) signaling.

  Certain signaling can also generate checkpointing events:
  - Blocking or unblocking of circuits
  - Circuit reset

Note The replicator mechanism does not try to replicate program or data storage. Service features are not checkpointed across processors; there is just enough information to maintain the voice or data path between the call originator and the call terminator.

If a switchover occurs before the voice path is established during call processing, the call cannot be checkpointed to the standby Cisco PGW 2200 Softswitch. Calls that are not established during call setup are lost in the Cisco PGW 2200 Softswitch that becomes active after the switchover.

Execution Environment Process Shell

The execution environment process shell is an operating system shell on the Cisco PGW 2200 Softswitch that enables it to access lower-level functionality. The low-level functions hold together the I/O, element management, and call engine subsystems on the Cisco PGW 2200 Softswitch. The execution environment infrastructure provides the following functions to Cisco PGW 2200 Softswitch processes:

- Operating system interface—Sun Solaris operating system command processor.
- Process management—Performs startup order, shutdown order, and monitoring of processes. Also performs software upgrade compatibility checking with minimal service interruption.
- Alarm management—Allows processes to register, set, and clear alarms, which are then presented to the AMS for further processing.
- Log management—Allows Cisco PGW 2200 Softswitch processes to log messages to locally persistent data files. Message codes (instead of strings) minimize the overhead of interprocess transport of long buffers. Log files reveal the process type that generates the log, and the logging level (severity).
- Measurement management—Allows processes to adjust counters or other metrics, which are subsequently presented to the AMS for Alarm and Measurement Report processing.
- Command management—Interface that can be used by any active processes or by an EMS interface, such as MML or SNMP agents, to exchange commands or responses.
- Configuration management—Notifies processes and gets responses when configuration data changes. Handles reconfiguration management when multiple processes are affected by changes.
- Access control—Allows only authorized processes to access certain services or other processes.
- Interprocess communication (IPC)—Allows processes to exchange messages.
- Event Processing Service—XEProcShell facility allows applications to register, deregister, and exchange events (messages) through IPC. This service is critical to efficient real-time CPU usage and overall system performance.
- Timers—Allow processes to set, clear, or monitor timers. Provide timeouts to processes.

Call Engine Process

The call engine is a process designed to provide the means and resources for call processing to take place. The call engine involves the following components:

- Resource manager—Performs the following functions:
  - Tracks all bearer resources used. Proxies and tracks the bearer resources in the trunking gateways within the Cisco PGW 2200 Softswitch service area.
  - Services all requests for allocation or deallocation of bearer resources from call instances.
  - Executes bearer allocation algorithms (circuit selection).
  - Manages echo cancellation for a call.
  - Performs continuity tests.
  - Checkpoints bearer states and modes to the standby Cisco PGW 2200 Softswitch to guarantee that the bearer channel is not lost during a manual or automatic switchover.

- Connection manager—Interfaces with the nodes and protocols external to the Cisco PGW 2200 Softswitch that are necessary to establish an IP (TCP, UDP, or RUDP) or PSTN connection that is managed by the Cisco PGW 2200 Softswitch. The types of nodes supported are:
  - VoIP/VoATM trunking gateways using MGCP.
  - Time Domain Multiplex (TDM) trunking gateways using MGCP.
- Call manager—Contains and selects the appropriate protocol adapters. These are protocol-specific entities that perform the following functions:
  - Communicates with the corresponding protocol-specific IOCC.
  - Converts incoming protocol data units (PDUs) received from the IOCC to an internal, protocol independent format.
  - Converts internal, protocol-independent PDUs to protocol-specific format.
  - Communicates current circuit states to the IOCM using the IOCCs.
  - Creates a call instance when an incoming call message is received.
  - Destroys that instance and frees any associated memory when the call is terminated.
  - Supports multiple call instances. It processes incoming messages from the event dispatcher queue and routes them to the call instance for which they are destined.
  - Generates call detail blocks (CDBs), which are used to create CDRs.
  - Operates as a standby entity, which is created when the call engine is created at system startup, and waits to create a new call, destroy an existing call, or process an event for an existing call.
  - Checkpoints call information, such as call signaling state and data, to the standby Cisco PGW 2200 Softswitch to guarantee that the signaling link is not lost during a manual or automatic switchover.

Call Instance Component

A call instance is the dynamic component of the Cisco PGW 2200 Softswitch that is created at run time and is the place where call processing takes place. The call instance is commonly referred to as the Message Definition Language (MDL) component, which is the language used to implement it.

The system creates a call instance when it receives an incoming call message. There is always a one-to-one relationship between a call instance and a call switched by the Cisco PGW 2200 Softswitch.

There are several significant subcomponents involved in a call instance:

- Originating call control (OCC)—Instance of the originating protocol's state machine. In defining a protocol, two MDL modules are created:
  - General declarations module, which contains protocol-specific types and definitions.
  - Protocol definition module, which contains the state logic for two state machines—one for call origination and one for call termination. This module produces an object file named *protocolName.mdo*.
- Universal call model (UCM)—Protocol-independent state machine that is used to:
  - Provide protocol interworking between the originating and the terminating sides of the call.
  - UCM MDL module is used to define the UCM behavior and logic. The UCM module is compiled into an object file, but can only be loaded by the Call Engine and cannot be used by any of the protocols.
  - Provide event-driven logic, which controls the following call-processing functions:

    - linking the OCC and the terminating call control (TCC)
    - updating and retrieving the call context structures
    - interacting with other call engine components, such as the resource manager, connection manager, and call manager
    - managing bearer resources, such as trunking gateways
    - using the MGCP
    - keeping the call processing state machine.
    - UCM also triggers events to be processed by the following MDL modules: generic analysis module, subscriber profile retrieval, A-number and B-number pre-analysis, A-number and B-number full analysis, route selection, and the IN trigger module.
- Connection plane manager (CPM)—Communicates with the call engine's resource manager to make the bearer connections to a remote trunking gateway using MGCP.
- CDR Manager—Generates CDRs and forwards them to the EMS to be locally persisted or forwarded for off-platform accounting applications. CDRs are generated when calls are answered. CDRs can be generated in the following situations also:
    - End of call (standard)
    - Long duration calls
    - Mid-call CDRs (can generate CDBs at eight different points in a call)
- Terminating call control—Instance of the terminating protocol's state machine.
- Call context—The following are the call context characteristics:
    - Persistent object in a call instance that serves as the placeholder for bearer and signaling information. Such information is set and retrieved by the OCC, TCC, or UCM at various points in the life of the call.
    - MDL context definition module is used to define the information elements, structures, and fields. This module is compiled into an object file to be used by all protocols.

      The format of these structures is protocol-independent to minimize cross-protocol conversion permutations. Contains rules for data conversion to and from each protocol.
    - Collects the following call information in CDBs, which are assembled to build CDRs: calling number, called number, answer time, disconnect time, originating trunk group and circuit identification code (CIC), terminating trunk group and CIC, address translation and route information, ISUP information, ISDN service information, database query information, call completion codes, and other information depending on the type of call.

Cisco PGW 2200 Softswitch Software Directory Structure

This section shows an overview of the UNIX file directory tree for the Cisco PGW 2200 Softswitch, along with a brief description of the purpose for each directory. Use this section as a guide for finding files called out in the operational procedures.

In the installation procedures, the installer is asked for a directory under which to install the Cisco PGW 2200 Softswitch software. The default directory is /opt/CiscoMGC; however, this directory name is installer-definable. Therefore, do not assume that /opt/CiscoMGC is used always. This is the directory under which nearly all files for the Cisco PGW 2200 Softswitch reside. Some temporary files that are created at run time.

Table 1-2 utilizes the variable $BASEDIR to indicate the directory into which the Cisco PGW 2200 Softswitch software is installed.

Table 1-2 Cisco PGW 2200 Softswitch Software Directory Structure

Directory	Description
$BASEDIR/bin	Cisco PGW 2200 Softswitch executable programs that cannot be customized.
$BASEDIR/data	MDL source files. Generally, MDL source files are not provided; but, if you purchase them, they will appear here.
$BASEDIR/dialPlan	Active Cisco PGW 2200 Softswitch dial plan area. This directory contains all the active dial plans on the Cisco PGW 2200 Softswitch.
$BASEDIR/etc	Network element configuration files. This directory includes all provisionable configuration files that are required for proper operation of the Cisco PGW 2200 Softswitch.
$BASEDIR/etc/CONFIG_LIB	Cisco PGW 2200 Softswitch configuration file library. This is a simple version control system for configuration file changes.
$BASEDIR/etc/cust_specific/toolkit	Saved data from the Cisco PGW 2200 Softswitch toolkit applications is stored in this directory.
$BASEDIR/lib	Shared object files. These libraries are loaded at runtime by the executables. The three types of libraries are: (1) system and program shared objects, (2) MDL interpreted objects, and (3) MDL shared objects.
$BASEDIR/license	Cisco PGW 2200 Softswitch license file area. This directory contains the license files that the Cisco PGW 2200 Softswitch requires.
$BASEDIR/local	Cisco PGW 2200 Softswitch executable programs that can be modified by the customer for a site-specific reason. See the procedures for how to customize files. Generally, the factory default values are sufficient.
$BASEDIR/patch	Intermediate patch file area. This directory contains the intermediate files during the patch installation.
$BASEDIR/snmp	SNMP agents and configuration area. This directory contains SNMP configuration files and SNMP agents, which communicate with SNMP clients on other managing software.
$BASEDIR/var	Subsystem communication and persistent storage area. This directory contains files and devices that provide communications between the various subsystems in the Cisco PGW 2200 Softswitch. It also contains files that provide persistent storage of data for the Cisco PGW 2200 Softswitch.
$BASEDIR/var/log	System logging area. This directory contains the platform logs, MML command logs, and disk monitor logs. See the "Understanding Logging Files" section on page A-1 for more information.

Table 1-2 Cisco PGW 2200 Softswitch Software Directory Structure (continued)

Directory	Description
$BASEDIR/var/spool	Dumper Spool Area. This directory contains historic reports. See the "Understanding Logging Files" section on page A-1.
$BASEDIR/var/trace	Signal Path Trace area. This directory contains all MDL trace logs that are used for conversion analysis.

CHAPTER 2

Cisco PGW 2200 Softswitch Platform Component Startup and Shutdown Procedures

Revised: March 7, 2011, OL-0800-14

This chapter describes how to start and shut down the individual components of the Cisco PGW 2200 Softswitch platform.

The startup procedures for each component of the Cisco PGW 2200 Softswitch platform are included in the following sections:

- Cisco PGW 2200 Softswitch Startup Procedures, page 2-2
- Cisco SS7 Interface Startup Procedure, page 2-3
- Cisco Switch Startup Procedure, page 2-4

You might need to perform one of these startup procedures after completing one of the following operations:

- Changing the system configuration
- Upgrading the software
- Testing the system
- Troubleshooting alarms
- Resolving a problem

Note While considering these procedures, it is assumed that the component is correctly installed, configured, and provisioned according to the instructions provided in the relevant documentation.

The shutdown procedure for each component of the Cisco PGW 2200 Softswitch platform is included in the following sections:

- Cisco PGW 2200 Softswitch Shutdown Procedure, page 2-4
- Cisco SS7 Interface Shutdown Procedure, page 2-5
- Cisco Switch Shutdown Procedure, page 2-6

Cisco PGW 2200 Softswitch Startup Procedures

This section contains the hardware and software startup procedures for the Cisco PGW 2200 Softswitch.

Starting the Cisco PGW 2200 Softswitch Hardware

The system switch of the Cisco PGW 2200 Softswitch is a rocker, momentary contact switch that functions as a standby device only. This switch controls the logic circuits that enable power module output.

Note The system switch for each Sun Netra platform is unique. See the documentation that is provided by Sun Microsystems for more information on your system.

To power on the system, complete the following steps:

Step 1 Turn on the power to all connected peripherals.

Note Peripheral power is activated before system power so that the system can recognize the peripherals when it is activated.

Step 2 Apply power to the system inlet.

Step 3 Press the front panel ON/STBY system switch to the ON position and hold it until the system starts to power up.

Starting the Cisco PGW 2200 Softswitch Software

Under normal conditions, simply powering up the system automatically launches the Cisco PGW 2200 Softswitch software and the Simple Network Management Protocol (SNMP) daemon using system defaults. See the "Configuring SNMP Support Resources" section in *Cisco PGW 2200 Softswitch Software Release 9.8 Installation and Configuration Guide* for more information about SNMP.

Note Ensure that the Cisco PGW 2200 Softswitch software Release 9 has been correctly installed, configured, and provisioned on the host server. Ensure that you have the appropriate packages, or applications, for your system. If the software has been installed, configured, or provisioned incorrectly, or you have other problems, see Chapter 6, "Troubleshooting the Cisco PGW 2200 Softswitch Platform," for more information.

Note To perform the procedures in this section, you must have a user ID that is part of the Cisco PGW 2200 Softswitch group (mgcgrp). Also, you must have the proper group privileges. To verify that your user ID is valid and that you have the necessary privileges, see the "Configuring Groups and Users" section in *Cisco PGW 2200 Softswitch Software Release 9.8 Installation and Configuration Guide* for more information.

Note The Cisco PGW 2200 Softswitch includes license files that are stored in a directory from which the Cisco PGW 2200 Softswitch gets the required license information. The Cisco PGW 2200 Softswitch uses the license file to enforce the available features and capacity. For more information about license features on the Cisco PGW 2200 Softswitch, see the document *Licensing Features for PGW 2200* at:

http://www.cisco.com/en/US/docs/voice_ip_comm/pgw/9/feature/module/9.7_3_/FlexLM.html

Starting the Cisco PGW 2200 Softswitch Software Manually

Caution Do not use the commands in this section or the subsequent commands in this chapter unless specifically instructed to do so by Cisco Technical Assistance Center (TAC) personnel.

To manually start the Cisco PGW 2200 Softswitch software, log in to the active Cisco PGW 2200 Softswitch as **root** and enter the following command:

```
# /etc/init.d/CiscoMGC start
```

This command restores execution permission and enables the automated startup script.

Cisco SS7 Interface Startup Procedure

This section contains the recommended startup procedure for the Cisco SS7 interfaces, which can be either a Cisco IP Transfer Point LinkExtender (ITP-L) or Cisco IP Transfer Point (ITP).

Note Ensure that the SS7 interface is installed and configured correctly and that the correct software version is installed. If you experience problems, see the documentation for your SS7 interface for detailed information.

To start a Cisco SS7 interface, perform the following steps:

Step 1 Before you start the Cisco SS7 interface, verify the following:

- All modules are installed correctly, and all interface cable connections are secure.
- Power cable is connected to both the rear panel power connector and the power source.
- Terminal is connected to the console port and is turned on.

Step 2 Turn on the power. During the boot process, observe the following:

- Power LED on the front panel should be green.
- Activity LED should be blinking.
- You should hear the system fans operating.
- Console terminal displays a script and system banner.

Step 3 Press Enter at the Enter Password prompt to access the console command line.

Cisco Switch Startup Procedure

This section contains the recommended startup procedure for the Cisco switches that internetwork with the elements of the Cisco PGW 2200 Softswitch platform.

Note Ensure that the switch is installed and configured correctly and that the correct software version is installed. If you experience problems, see the documentation for your switch for detailed information.

To start a Cisco switch, complete the following steps:

Step 1 Before you start the switch, verify the following:

- All modules are installed correctly, and all interface cable connections are secure.
- Each power supply is installed correctly and is connected to a grounded power source.
- If two power supplies are present, each power cord is connected to a different line.
- A terminal is connected to the supervisor module console port and is turned on.

Step 2 Turn on the power supplies (|). During the boot process, observe the following:

- The LEDs on the power supplies should be green.
- The PS1, PS2, and fan LEDs on the supervisor engine should be green, and you should hear the system fans operating.
- The System Status LED on the supervisor engine should be green after the boot is complete. It flashes red, orange, and green during startup.
- The supervisor engine interface LEDs and module LEDs (such as the Link LEDs) might blink or stay lit continuously during the boot process. Many module LEDs do not go on until you configure the interfaces. Wait until the boot is complete before trying to verify the module LED indications.
- The console terminal displays a script and system banner.
- The supervisor engine begins to initialize the modules once the boot process has completed. Messages appear on the console as the modules come online.

Step 3 Press Enter at the Enter Password prompt to access the console command line.

Cisco PGW 2200 Softswitch Shutdown Procedure

This section contains the software and hardware shutdown procedures for the Cisco PGW 2200 Softswitch.

Shutting Down the Cisco PGW 2200 Softswitch Software Manually

Caution Do not use the commands in this section or the subsequent commands in this chapter unless specifically instructed to do so by Cisco Technical Assistance Center (TAC) personnel.

To manually stop the Cisco PGW 2200 Softswitch software, log into your active Cisco PGW 2200 Softswitch as **root** and enter the following command:

```
# /etc/init.d/CiscoMGC stop
```

This command disables the automated startup script.

Shutting Down the Cisco PGW 2200 Softswitch Hardware

To shut down the Cisco PGW 2200 Softswitch, remove power from the system. The power switch of the Cisco PGW 2200 Softswitch is a rocker, a momentary contact switch that functions as a standby device only. The switch controls logic circuits that enable power module output.

Caution Before you turn off the power, exit the operating system. Failure to do so might result in data loss.

To shut down the Cisco PGW 2200 Softswitch, complete the following steps:

Step 1 Where necessary, notify users that the Cisco PGW 2200 Softswitch is out of service.

Step 2 Back up system files and data before shutdown. See the "Backing Up System Software" section on page 3-29.

Step 3 Exit the operating system. See your Sun documentation for the appropriate commands to issue to exit the operating system.

Note Ensure that you issue the **init 5** UNIX command as part of the procedure for exiting the operating system. The Sun Microsystems documentation describes this command.

Step 4 Momentarily set the front panel power switch to the STBY position until the system powers down.

Step 5 Verify that the POWER LED is off.

Step 6 Remove the input power connector from the power inlet.

Warning **Regardless of the position of the ON/STBY switch, if an AC or DC power cord remains connected to the system, voltage might be present within the power supply.**

Cisco SS7 Interface Shutdown Procedure

To shut down the Cisco SS7 interfaces, set the power switches to the OFF (0) position.

When the power switches are in the OFF (0) position, the power LEDs on the front panels should be off and the fans should not be operating.

Cisco Switch Shutdown Procedure

To shut down the Cisco switches, set the power switches to the OFF (0) position.

When the power switches are in the OFF (0) position, the LEDs on the power supplies should be off and the fan assembly should not be operating.

CHAPTER 3

Cisco PGW 2200 Softswitch Platform Operations

Revised: March 11, 2011, OL-0800-14

This chapter presents recommended operating procedures for the Cisco PGW 2200 Softswitch platform.

Ensure that all components are correctly installed, configured, and provisioned according to the instructions provided in the relevant documentation. All components should have started successfully, as described in Chapter 2, "Cisco PGW 2200 Softswitch Platform Component Startup and Shutdown Procedures."

Note To operate the Cisco PGW 2200 Softswitch, you should understand the complexities of the system, be experienced in administering the system, and be capable of using the UNIX operating system with system-administrator proficiency.

This chapter contains the following sections:

- Daily Tasks, page 3-1
- Periodic Maintenance Procedures, page 3-23
- Regular Operations, page 3-38

Daily Tasks

The following section details the procedures you should perform on a daily basis on the Cisco PGW 2200 Softswitch. These procedures use Man-Machine Language (MML) and UNIX commands. These procedures can also be performed using the optional Cisco MGC Node Manager (MNM) application. For more information on using the Cisco MNM to operate the Cisco PGW 2200 Softswitch, see the *Cisco Media Gateway Controller Node Manager User Guide*.

The tasks that you should perform daily are presented in the following sections:

- Starting an MML Session, page 3-2
- Verifying the Platform State of the Cisco PGW 2200 Softswitches, page 3-2
- Verifying That Processes Are Running, page 3-4
- Monitoring the Alarms Status, page 3-7
- Verifying the Status of all Signaling Services, page 3-9
- Verifying State of all SS7 Routes, page 3-12
- Verifying CIC States, page 3-15

- Verifying System Statistics, page 3-18
- Verifying the Number of Active Processes, page 3-19
- Verifying the Number of Users, page 3-21
- Verifying Available Virtual Memory, page 3-21
- Verifying Available Memory on the Cisco ITP-Ls, page 3-22

Starting an MML Session

When a procedure requires that you start an MML session, you must perform the following steps:

Note You should run your MML sessions from the active Cisco PGW 2200 Softswitch, unless the procedure indicates otherwise.

Step 1 Log in to the active Cisco PGW 2200 Softswitch.

Note Do not log in as UNIX root. The MML session fails if you attempt to start it as UNIX root.

Step 2 Enter the following command at the UNIX prompt:

mml

If you receive an error message indicating that sessions are already in use, enter the following command:

mml *-s session number*

Use any session number from 2 through 12 and repeat until you find a vacant session. After you have successfully started an MML session, the prompt changes as shown in the following example:

machine_name **mml**>

Verifying the Platform State of the Cisco PGW 2200 Softswitches

You can determine which of your Cisco PGW 2200 Softswitches is the active Cisco PGW 2200 Softswitch and, which is the standby Cisco PGW 2200 Softswitch. If your system uses a Cisco PGW 2200 Softswitch in a simplex configuration, the single Cisco PGW 2200 Softswitch is always active. To learn which Cisco PGW 2200 Softswitch is active, complete the following steps:

Step 1 Log into one of the Cisco PGW 2200 Softswitches, start an MML session, and enter the following command to determine its platform state:

rtrv-ne

The system should return a message, like the following, if it is currently the active Cisco PGW 2200 Softswitch:

```
MGC-01 - Media Gateway Controller 2008-10-07 02:56:16.623 EDT
M  RTRV
   "Type:MGC"
```

```
"Hardware platform:sun4u sparc SUNW,Sun-Fire-V210"
"Vendor:"Cisco Systems, Inc.""
"Location:MGC-01 - Media Gateway Controller"
"Version:"9.8(1)""
"Platform State:ACTIVE"
```

The valid values for the Platform State field are ACTIVE, STANDBY, or OOS.

Step 2 Log into the other Cisco PGW 2200 Softswitch, start an MML session, and enter the following command to determine its platform state:

```
rtrv-ne
```

The system should return a message that indicates that it is in either the active or standby platform state.

If the Cisco PGW 2200 Softswitches changed their platform state, determine why the switchover occurred by searching the contents of the active system log file, as described in the "Viewing System Logs" section on page 6-90.

Under normal operations, one Cisco PGW 2200 Softswitch should be active and the other Cisco PGW 2200 Softswitch should be standby.

If the platform state of either Cisco PGW 2200 Softswitch is OOS, check the alarms that are described in the "Monitoring the Alarms Status" section on page 3-7. Perform the actions necessary to correct the condition that caused the associated alarms. The alarms that require you to take corrective action and their associated actions can be found in the "Alarm Troubleshooting Procedures" section on page 6-4. A complete listing of alarms can be found in the *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

If the platform state of both Cisco PGW 2200 Softswitches is active, proceed to Step 5.

Step 3 Use the following command to quit the MML session:

```
quit
```

Step 4 Verify that the active configuration has not changed using the following UNIX commands:

```
cd /opt/CiscoMGC/etc
ls -l
```

The system returns a response like the following:

```
total 35350
-rw-r--r--   1 mgcusr mgcgrp     38240 May  8 10:46 02.trigger
-rw-rw-r--   1 mgcusr   mgcgrp     20488 Oct 10  2000 64eisup.bat
lrwxrwxrwx   1 mgcusr   mgcgrp        43 Aug  1 18:55 active_link ->
/opt/CiscoMGC/etc/CONFIG_LIB/CFG_pol-addipl
-rw-rw-rw-   1 mgcusr   mgcgrp     30907 Jul 24 15:29 alarmCats.dat
-rw-rw-rw-   1 mgcusr   mgcgrp      2064 Jun  4 10:57 alarmTable.dat
-rw-rw-rw-   1 mgcusr   mgcgrp         0 Jun  4 10:57 auxSigPath.dat
```

Identify the active_link file. The listing indicates which configuration is currently active. The active configuration in the example is CFG_pol-addipl.

If the configuration has changed, compare the active configuration to the previous configuration.

Step 5 Collect system data according to the "Collecting System Data for Cisco TAC" section on page 6-93 and contact the Cisco TAC to analyze the problem further and determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Verifying That Processes Are Running

To verify that the processes on your Cisco PGW 2200 Softswitch are running, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the following command:

```
rtrv-softw:all
```

The system returns a response like the following:

Note The following sample output was generated by Cisco PGW 2200 Softswitch Release 9.7(3) Patch 14 software. The system output varies based on your software version, patch version, and configuration.

```
MGC-01 - Media Gateway Controller 2008-04-16 00:22:02.696 EDT
M  RTRV
   "CFM-01:RUNNING ACTIVE"
   "ALM-01:RUNNING ACTIVE"
   "MM-01:RUNNING ACTIVE"
   "AMDMPR-01:RUNNING ACTIVE"
   "CDRDMPR-01:RUNNING ACTIVE"
   "DSKM-01:RUNNING IN N/A STATE"
   "MMDB-01:RUNNING IN N/A STATE"
   "POM-01:RUNNING ACTIVE"
   "MEASAGT:RUNNING ACTIVE"
   "OPERSAGT:RUNNING ACTIVE"
   "Replic-01:RUNNING ACTIVE"
   "ENG-01:RUNNING ACTIVE"
   "IOCM-01:RUNNING ACTIVE"
   "TCAP-01:RUNNING IN N/A STATE"
   "FOD-01:RUNNING IN N/A STATE"
   "LMAGT-01:RUNNING ACTIVE"
   "pril3-1:RUNNING IN N/A STATE"
   "mgcp-1:RUNNING IN N/A STATE"

<Press 'SPACE' for next page, 'Enter' for next line or 'q' to quit this output>
   "h248-1:RUNNING IN N/A STATE"
   "sip-1:RUNNING IN N/A STATE"
   "eisup-1:RUNNING IN N/A STATE"
   "eisup-2:RUNNING IN N/A STATE"
   "ss7-i-1:RUNNING IN N/A STATE"
   "m3ua-1:RUNNING IN N/A STATE"
   "sua-1:RUNNING IN N/A STATE"
   "iua-1:RUNNING IN N/A STATE"
```

Note If any of the processes stop, you can see "*process name*:STOPPED" in the system output.

Note If you enter this MML command on the standby Cisco PGW 2200 Softswitch, the state of the processes is either RUNNING STANDBY or RUNNING IN N/A STATE.

Step 2 If any of the processes are initializing, wait a few moments and repeat Step 1. If that process is still initializing, contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

If any of the processes stop, contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

Understanding Processes

The Cisco PGW 2200 Softswitch software contains processes and process groups that perform various functions. These functions include managing the I/O channels; generating alarms, call detail records (CDRs), and logs; and performing signal conversion. The Cisco PGW 2200 Softswitch software process manager processes all these processes.

There are three different process monitoring levels:

- Active process—Controlled and monitored directly by the process manager.
- Passive process—Does not communicate with the process manager.
- Monitoring process—Periodically runs an executable file or script and sets or clears an alarm that is based on the return code. This type of process can monitor other processes or tasks that can be checked programmatically. Some examples are the amount of available disk space, system daemon existence, and established process dependency.

Table 3-1 shows the system processes and process groups that are controlled by the process manager. All the processes are in the directory /opt/CiscoMGC/bin.

Table 3-1 Processes Controlled by the Process Manager

Group	Process	Description
ENGG-01		**Engine Group**
	Replic-01	Replicator controller. It is an active process. If it fails, it causes a critical out-of-service alarm.
	ENG-01	Call engine. It is an active process. If it goes down, the system cannot process calls. Its failure causes a critical out-of-service alarm.
IOSG-01		**I/O Subsystem Group**
	IOCM-01	I/O channel manager. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	TCAP-01	TCAP and SCCP protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	pril3-1	ISDN protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	mgcp-1	MGCP protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	h248-1	H.248 protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	sip-1	SS7 protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	eisup-1	EISUP protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.

Table 3-1 Processes Controlled by the Process Manager (continued)

Group	Process	Description
	ss7-i-1	SS7 protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	m3ua-1	M3UA protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	sua-1	SUA protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
	iua-1	IUA protocol handler. It is a passive process. If it goes down, it causes a major out-of-service alarm.
XEG-01		**Execution Environment Group**
	CFM-01	Configuration manager. It is an active process. If it goes down, it causes a major out-of-service alarm.
	ALM-01	Alarm manager. It is an active process. If it goes down, it causes a major out-of-service alarm.
	AMDMPR-01	Alarm and measurement dumper. It is an active process. If it goes down, it causes a major out-of-service alarm.
	MM-01	Measurement manager. It is an active process. If it goes down, it causes a major out-of-service alarm.
	CDRDMPR-01	CDR dumper. It is an active process. If it goes down, it causes a major out-of-service alarm.
	MMDB-01	TimesTen database. It is a passive process. If it goes down, it causes a minor out-of-service alarm.
	POM-01	Provisioning object manager. It is an active process. If it goes down, it causes a major out-of-service alarm.
FTG-01		**Failover Group**
	FOD-01	Failover (switchover) controller. It is a monitoring process. If it goes down, it causes a minor out-of-service alarm.
PFMG-01		**Platform Monitoring Group**
	DSKM-01	Disk space monitor. This shell script monitors disk space. It trims older files if the current amount of free space goes below a specified threshold. This is a monitoring process. If it goes down, it causes a minor out-of-service alarm.
	LMAGT-01	Cisco PGW 2200 Softswitch license management agent. This is an active process. If it goes down, it causes a critical out-of-service alarm.
SNMPG-01		**SNMP Group**
	MEASAGT	Measurements SNMP agent. This process is an active process. If it goes down, it causes a major out-of-service alarm.
	OPERSAGT	Operational SNMP Agent. This process is an active process. If it goes down, it causes a major out-of-service alarm.

Monitoring the Alarms Status

If you monitor the alarm status of the Cisco PGW 2200 Softswitch continuously, you can determine how often a particular alarm occurs in a specific period. To monitor the alarm status of the Cisco PGW 2200 Softswitch continuously, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the following command:

```
rtrv-alms::cont
```

The system returns a response that shows all active alarms:

```
MGC-01 - Media Gateway Controller 2001-11-16 11:57:54.949 EST
 M  RTRV
    "AMDMPR-01: 2001-11-16 11:57:54.583 EST,ALM=\"MAJOR M-OOS\",SEV=MJ"
    "CDRDMPR-01: 2001-11-16 11:57:54.583 EST,ALM=\"MAJOR M-OOS\",SEV=MJ"
    "MMDB-01: 2001-11-16 11:57:54.583 EST,ALM=\"SOFTW NON\",SEV=MJ"
    "MMDB-01: 2001-11-16 11:57:54.583 EST,ALM=\"MINOR M-OOS\",SEV=MN"
    "MEASAGT: 2001-11-16 11:57:54.583 EST,ALM=\"SOFTW NON\",SEV=MJ"
    "MEASAGT: 2001-11-16 11:57:54.583 EST,ALM=\"MAJOR M-OOS\",SEV=MJ"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 15\",SEV=MN"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 60\",SEV=MN"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 24\",SEV=MN"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 15\",SEV=MN"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 60\",SEV=MN"
    "UNK: 2001-11-16 11:57:54.583 EST,ALM=\"CHAN BAD TOT 24\",SEV=MN"
    ;
```

Step 2 If an alarm appears, determine the appropriate course of action by referring to the listing for that alarm in *Cisco PGW 2200 Softswitch Release 9 Messages Reference*. For detailed descriptions of the actions that are required to resolve the problems that are associated with the alarm, see the "Alarm Troubleshooting Procedures" section on page 6-4.

You can also find additional information on the conditions that caused the alarms by viewing the system logs. You can view the logs using the log viewer, part of the Cisco MGC viewer toolkit. For information on using the log viewer, see the "Using the Log Viewer" section on page 3-128.

Press **Ctrl-C** to stop the alarm monitor.

Note When you begin to monitor alarms continuously, you must open another MML session to perform any additional tasks. See the "Starting an MML Session" section on page 3-2 for more information on starting additional MML sessions.

Understanding Alarms

The following subsections describe each of the message components for the typical alarm response that is shown below:

```
"LPC-01: 2001-02-26 09:16:07.806 EST,ALM=\"SCMGC MTP3 COMM FAIL\",SEV=MJ"
"IOCM-01: 2001-02-26 09:17:00.690 EST,ALM=\"Config Fail\",SEV=MN"
"MGC1alink2: 2001-02-26 09:17:47.224 EST,ALM=\"SC FAIL\",SEV=MJ"
"MGC1alink3: 2001-02-26 09:17:47.225 EST,ALM=\"SC FAIL\",SEV=MJ"
```

Component ID

The first element of the alarm message identifies the system component that generated the alarm, using the customer-defined description of the component that is entered during system provisioning. In the example, these components are LPC-01, IOCM-01, MGC1alink2, and MGC1alink3.

All system components are described in *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

Time Stamp

The second element of the alarm message identifies the time of the alarm by year, month, day, hour, minute, hundredths of a second, thousandths of a second (milliseconds), and time zone. The time that is displayed is the system time. In the example, these times would be 2001-02-26 09:16:07.806 EST, 2001-02-26 09:17:00.690 EST, 2001-02-26 09:17:47.224 EST, and 2001-02-26 09:17:47.225 EST.

Alarm Category

The third element of the alarm message identifies the alarm category. It indicates the MML description of the alarm (event). In the example:

- ALM=\"SCMGC MTP3 COMM FAIL\" indicates an SCMGC-MTP3 communications failure.
- ALM=\"Config Fail\" indicates a configuration failure.
- ALM=\"SC FAIL\" indicates a signal channel failure.

Severity Level

The last element of the alarm message identifies the severity level of the alarm. The four levels are:

- Critical (CR)—A serious problem exists in the network. Critical alarms cause a switchover, where the active Cisco PGW 2200 Softswitch switches processing to the standby Cisco PGW 2200 Softswitch. Because critical alarms affect service, you should clear them immediately.

Caution Critical alarms cause the system to switchover automatically. While a switchover is in progress, new calls are dropped and in-progress calls are sustained.

- Major (MJ)—A problem exists that disrupts service. You should clear major alarms immediately. These alarms differ from critical alarms because they do not cause a switchover from the active Cisco PGW 2200 Softswitch to the standby Cisco PGW 2200 Softswitch.
- Minor (MN)—Note and then clear minor alarms as soon as possible. Determine how often this alarm appears, because it might indicate a bigger problem.
- Informational (IN)—This severity level applies to messages that provide information about typical events and conditions. Informational messages do not require corrective action. Examples are timer expirations, values that have exceeded preset thresholds, and unexpected responses from endpoints to signaling messages sent by the Cisco PGW 2200 Softswitch. Only the SNMP Manager retrieves events of the informational severity level.

An Alarm Example

This section provides an alarm example, SS7 SIG SRVC UNAVAIL.

Output of rtrv-alms MML command

```
MGC-01 - Media Gateway Controller 2008-4-21 03:14:42.733 EDT
 M  RTRV
    "ss7svc1: 2008-4-21 03:12:15.563 EDT,ALM=\"SS7 SIG SRVC UNAVAIL\",SEV=MJ"
```

In this example, the component that generates the alarm is ss7svc1. The timestamp for this alarm is 2008-4-21 03:12:15.563 EDT. The alarm category indicates that an SS7 signaling service is unavailable. The severity for this alarm is major.

Details for this alarm

To view the detailed description, cause, alarm type, severity, and action of this alarm, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference* at:

http://www.cisco.com/en/US/docs/voice_ip_comm/pgw/9/system/message/errmsg.html

Alarm Log

To view the archived alarm, view alm.csv in the folder /opt/CiscoMGC/var/log.

```
...
0, 1208761935,127,0,2,”SS7 Signaling Service Unavailable”, “ss7svc1“, “IosChanMgr”
...
```

See the “Understanding the Format of Log Files Archived Using Data Dumper” section on page A-5 for the detailed information on the alarm log format.

Verifying the Status of all Signaling Services

To verify the status of all the signaling services that are provisioned on your Cisco PGW 2200 Softswitch, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the following command:

```
rtrv-dest:all
```

The system returns a response similar to the following:

```
   Media Gateway Controller - MGC-04 2000-04-05 08:05:36
M  RTRV
   "sigsrv1:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "sigsrv2:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "sigsrv3:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "sigsrv4:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "sigsrv5:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "sigsrv6:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
   "eisupftsvc:PKG=EISUP,ASSOC=SWITCHED,PST=IS,SST=UND"
   "eisupsvc1:PKG=EISUP,ASSOC=SWITCHED,PST=IS,SST=UND"
```

Note If you enter the **rtrv-dest:all** MML command after a switchover has occurred, the state of some of the signaling services might be listed as undefined (UND). UND is the default state for a signaling service when the system starts. In this instance, UND indicates that the Cisco PGW 2200 Softswitch has not received a service state message for the associated signaling service since the switchover occurred. No user action is required.

Step 2 If the primary service state is *not* in service (IS) for any of the signaling service, check your alarms retrieval MML session for signaling-related alarms. The "Monitoring the Alarms Status" section on page 3-7 describe the method for setting up an alarms-retrieval MML session.

If a signaling-related alarm appears, you can determine the appropriate course of action by searching for the corrective actions for that alarm in the "Alarm Troubleshooting Procedures" section on page 6-4. If the alarm is not in that section, corrective action is not required. More information on the alarm can be found in *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

You can also find additional information on the conditions that caused the alarms by viewing the system logs. The logs can be viewed using the log viewer, part of the Cisco MGC viewer toolkit. For information on using the log viewer, see the "Using the Log Viewer" section on page 3-128.

Note You can also use the **rtrv-dest** MML command to retrieve information on individual signaling services using the procedure that is presented in the "Retrieving Signaling Service States" section on page 3-45.

Understanding the Signaling Service State Information

The following sections describe the information that is returned by the system when you enter the **rtrv-dest** command, as shown in the following example:

```
"sigsrv1:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
"sigsrv2:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
"sigsrv3:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=UND"
```

Destination

The first field lists the MML name of the associated signaling service. In the preceding example, the signaling services are sigsrv1, sigsrv2, and sigsrv3.

Package

The PKG field lists the protocol package that is associated with the destination. In the example, the protocol is SS7-ANSI.

Association

The ASSOC field shows the type of association, either unknown, switched, or a specific channel for the signaling service. In the example, the association type is SWITCHED.

Primary Service State

The PST field shows the current primary service state of the signaling service. In the example, all of the signaling services have a primary service state of IS. Table 3-2 lists the valid primary service state values:

Table 3-2 Signaling Service Primary Service States

Link State ID	Link State	Description
AOOS	Automatically out-of-service	The system has taken the signaling service OOS[1].
INB	Install busy	When a system is first configured, all signaling links default to this state and must be manually set IS[2] by entering the **set-c7lnk**, **set-iplnk**, or **set-dchan** MML commands.
IS	In-service	The link to the signaling service is IS and fully operational. This state is its normal operating state.
MOOS	Manually out-of-service	The link to the signaling service has been manually set to OOS.
OOS	Out-of-service	The link to the signaling service is OOS from the remote end. The system is actively trying to restore the link.
TRNS	Transient	The state of the link to the signaling service is currently being changed.
UNK	Unknown	The state of the link to the signaling service is not known.

1. OOS = out-of-service.
2. IS = in-service.

Secondary Service State

The SST field shows the current secondary service state of the specified signaling service. In the example, all of the signaling services have a secondary service state of UND. The valid states are presented in the following list:

- CEA—Commanded into emergency alignment.
- CIS—Commanded in service.
- CONG—Congestion.
- COOS—Commanded out of service.
- CINH—Commanded to the inhibited state.
- CRTE—Created.
- CUINH—Commanded to the uninhibited state.
- DLT—Deleted.

Note DLT is a transition state. This state occurs when you are making provisioning changes to the associated signaling service.

- EIS—Engine in service.
- EOOS—Engine out of service.

- FLD—Failed.
- FOOS—Forced out of service.
- RST—Reset.
- RSTO—Restored.
- UND—Undefined.

Note If you enter the **rtrv-dest** MML command after a switchover occurs, the state of some of the signaling services might be listed as undefined (UND). UND is the default state for a signaling service when the system starts. In this instance, UND indicates that the Cisco PGW 2200 Softswitch has not received a service state message for the associated signaling service since the switchover occurred. No user action is required.

Verifying State of all SS7 Routes

To verify the status of all of the SS7 routes provisioned on your Cisco PGW 2200 Softswitch, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch.

Step 2 Start an MML session.

Step 3 Enter the following command:

```
rtrv-rte:all
```

The system returns a message similar to the following:

```
Media Gateway Controller - MGC-01 2002-05-22 15:19:51 M RTRV
   "ss7srv1:linkset1,APC=apc-1,OPC=opc-1,PRIO=1,PST=IS,SST=NA"
   "ss7srv1:linkset2,APC=apc-2,OPC=opc-1,PRIO=1,PST=IS,SST=NA"
   "ss7srv2:linkset1,APC=apc-3,OPC=opc-2,PRIO=1,PST=IS,SST=NA"
   "ss7srv2:linkset2,APC=apc-3,OPC=opc-2,PRIO=1,PST=IS,SST=NA"
   "ss7srv3:linkset1,APC=apc=4,OPC=opc-3,PRIO=1,PST=IS,SST=NA"
   "ss7srv3:linkset2,APC=apc=4,OPC=opc-4,PRIO=1,PST=IS,SST=NA"
```

Step 4 If the primary service state is *not* IS for any of the routes, check your alarms-retrieval MML session for signaling-related alarms. The "Monitoring the Alarms Status" section on page 3-7 describes the method for setting up an alarms-retrieval MML session.

If a signaling-related alarm appears, you can determine the appropriate course of action by searching for the corrective actions for that alarm in the "Alarm Troubleshooting Procedures" section on page 6-4. If the alarm is not in that section, corrective action is not required. More information on the alarm can be found in *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

You can also find additional information on the conditions that caused the alarms by viewing the system logs. The logs can be viewed using the log viewer, part of the Cisco MGC viewer toolkit. For information on using the log viewer, see the "Using the Log Viewer" section on page 3-128.

Understanding the SS7 Route State Information

The following sections describe the information that is returned by the system when you enter the **rtrv-rte** command, as shown in the following example:

```
"ss7srv1:linkset1,APC=apc-1,OPC=opc-1,PRIO=1,PST=IS,SST=NA"
"ss7srv1:linkset2,APC=apc-2,OPC=opc-1,PRIO=1,PST=IS,SST=NA"
"ss7srv2:linkset1,APC=apc-3,OPC=opc-2,PRIO=1,PST=IS,SST=NA"
"ss7srv2:linkset2,APC=apc-3,OPC=opc-2,PRIO=1,PST=IS,SST=NA"
```

Signaling Service

The first field lists the MML name for the signaling services that are associated with the SS7 route. In the example, the signaling services are ss7srv1 and ss7srv2.

Linkset

The second field lists the MML name for the linksets that are associated with the SS7 route. In the example, the linksets are linkset1 and linkset 2.

Adjacent Point Code

The APC field lists the MML name for the adjacent point code (APC) associated with the SS7 route. In the example, there are APCs:

- apc-1
- apc-2
- apc-3
- apc-4

Originating Point Code

The OPC field lists the MML name for the originating point code (OPC) associated with the SS7 route. In the example, there are OPCs:

- opc-1
- opc-2
- opc-3
- opc-4

Priority

The PRIO field lists the priority that is provisioned for this SS7 route. In the example, all of the SS7 routes have a priority of 1.

Primary Service State

The PST field shows the current primary service state of the destination. In the example, all of the SS7 routes have a primary service state of IS. Table 3-3 lists the valid primary service state values:

Table 3-3 SS7 Route Primary Service States

Link State ID	Link State	Description
AOOS	Automatically out-of-service	System has taken the SS7 route OOS.
INB	Install busy	When a system is first configured, all signaling links default to this state and must be manually set to in-service (IS) by using the **set-dest** MML command.
IS	In-service	SS7 route is IS and fully operational. This state is its normal operating state.
MOOS	Manually out-of-service	SS7 route has been manually set to OOS.
OOS	Out-of-service	SS7 route is OOS from the remote end. The system is actively trying to restore the link.
TRNS	Transient	State of the link to the SS7 route is currently being changed.
UNK	Unknown	State of the link to the SS7 route is not known.

Secondary Service State

The SST field shows the current secondary service state of the specified destination. In the example, all of the SS7 routes have a primary service state of NA. The following list presents the valid states:

- ACKD—SS7 Acknowledgement delay
- BSNR—SS7 backward sequence number received (BSNR)
- CIS—Commanded in service
- CONF—Configuration failure
- COOS—Commanded out of service
- ENGR—Call engine reset
- ISPEND—In service, pending
- LCNG—Congestion, local
- LINE—Line failure
- LINH—SS7 local inhibit
- LINK—Link failure
- LINS—Linkset failure
- NA—Cause not available
- OOSPEND—Out of service, pending
- PRHB—SS7 prohibited
- RBLK—SS7 remote blocked
- RCNG—Congestion, remote

- RINH—SS7 remote inhibit
- RSTR—SS7 restricted
- SERR—SS7 signal error
- STBY—Cause standby
- SUPPENT—Supporting entity
- TPATH—Traffic path
- UNK—Cause unknown

Verifying CIC States

You should verify the status of your circuit identification codes (CICs) in groups, to ensure that you have current state information. Retrieving the status of all of your CICs at once takes some time. It takes more time to page through the information.

To verify the status of CICs provisioned on your Cisco PGW 2200 Softswitch in groups, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch.

Step 2 Start an MML session.

Step 3 Enter the following command:

rtrv-cic:*sig_srv***:cic=***number*[**,rng=***range*]

Where:

- *sig_srv*—MML name of the signaling service that is associated with the displayed CICs.
- *number*—A valid CIC number.
- *range*—Specifies a range of CICs for the system to retrieve. The system displays the status of all CICs between *number* and *number+range*.

For example, the following MML command retrieves bearer channel information for CICs **10** to **15** on signaling service **c7s-1**:

```
rtrv-cic:c7s-1:cic=10,rng=5
```

When the Cisco PGW 2200 Softswitch software is configured for signaling, the system returns a response like the following:

```
   Media Gateway Controller - MGC-04 2000-04-05 08:05:54
M  RTRV
    "c7s-1:CIC=10,PST=IS,CALL=IDLE,BLK=NONE"
    "c7s-1:CIC=11,PST=IS,CALL=IDLE,BLK=NONE"
    "c7s-1:CIC=12,PST=IS,CALL=IDLE,BLK=NONE"
    "c7s-1:CIC=13,PST=IS,CALL=IDLE,BLK=NONE"
    "c7s-1:CIC=14,PST=IS,CALL=IDLE,BLK=NONE"
    "c7s-1:CIC=15,PST=IS,CALL=IDLE,BLK=NONE"
```

When the Cisco PGW 2200 Softswitch software is configured for call control, the system returns a response similar to the following:

```
   Media Gateway Controller - MGC-04 2000-04-05 08:05:54
M  RTRV
   "c7s-1:CIC=10,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=11,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

```
"c7s-1:CIC=12,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
"c7s-1:CIC=13,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
"c7s-1:CIC=14,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
"c7s-1:CIC=15,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

Step 4 If the primary service state is *not* IS for any of the CICs, or if a CIC is blocked, check your alarms-retrieval MML session for bearer-related alarms. The "Monitoring the Alarms Status" section on page 3-7 describes the method for setting up an alarms-retrieval MML session.

If a bearer channel-related alarm appears, you can determine the appropriate course of action by searching for the corrective actions for that alarm in the "Alarm Troubleshooting Procedures" section on page 6-4. If the alarm is not in that section, corrective action is not required. More information on the alarm can be found in *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

Understanding CIC States

The elements of the output from the **rtrv-cic** MML command are described in the following paragraphs.

Circuit Identification

The output of this command identifies the MML name of the associated signaling channel and the number for each CIC.

Primary Service State

The PST field shows the current primary service state of the CIC. Table 3-4 lists the valid primary service state values.

Table 3-4 CIC Primary Service States

Link State ID	Link State	Description
IS	In-service	The traffic channel or CIC is IS and fully operational. This state is its normal operating state.
OOS	Out-of-service	The traffic channel or CIC is OOS from the remote end. The system is actively trying to restore the link. Individual CICs can be OOS even if the destination is IS, because of signaling events such as Q.931 service messages.

Call State

The CALL field identifies the current call state of each CIC. After a call is initiated, a circuit does not return to the Idle (available) state until all related release signaling is satisfactorily completed (the correct release sequence). In and Out call states indicate that the CIC is not available for new calls. Table 3-5 describes the various call states.

Table 3-5 CIC Call States

State	Description
In	Incoming call is in progress. Bearer channel is not available for a new call.
Out	Outgoing call is in progress. Bearer channel is not available for a new call.
Idle	Circuit is available for use.

Media Gateway State

The GW_STAT field identifies the current state of the media gateway that is associated with each CIC. Table 3-6 describes the various media gateway states.

Table 3-6 Media Gateway States

State	Description
CARRIER_FAILURE	Individual CIC has failed. If this state is seen for all CICs associated with a T1 or E1, it indicates that the associated T1 or E1 has failed. This state is the only media gateway state that is checkpointed to the standby Cisco PGW 2200 Softswitch.
CXN_IS	The connection is in-service on the active Cisco PGW 2200 Softswitch.
CXN_OOS_ACTIVE	The connection is out of service on the active Cisco PGW 2200 Softswitch.
CXN_OOS_STANDBY	The connection is out of service on the standby Cisco PGW 2200 Softswitch.
GW_HELD	The connection is being held at the media gateway. This state occurs because of a command timeout or an unexpected response. This state is only applicable to the active Cisco PGW 2200 Softswitch.

Circuit Block Type

The BLK field identifies the type of circuit block that has been placed on the CIC. Blocked circuits are not available for calls. Table 3-7 describes the valid circuit block types.

Table 3-7 Circuit Block Types

Type	Description
COT_FAIL	Blocked because a continuity test failed on the CIC.
GATEWAY	Locally blocked on a switched system because of a media gateway event. For example, a media gateway interface might fail, which causes the transmission of an RSIP message; but, the associated CICs remain in-service. As another example, this block type might occur when an RSIP message is not acted upon because of a mismatch between the MGCP hostname in the RSIP string and the host name that is provisioned in the media gateway. If the associated switch does not responding to group unblock messages, the CICs stay in the GATEWAY circuit block state. Your CICs should be in this state when you bring up the Cisco PGW 2200 Softswitch or media gateway. Once the associated switch acknowledges the unblock message, the CICs transition from this state. If the CICs stay in the GATEWAY circuit block state, troubleshoot the problem with the media gateway.
INTERFACE_DISABLED	Interface is disabled because the system received a CGB message or a new service has been started, which is still in the install busy (INB) state.
LOCAUTO	Hardware blocking type—An external message that is generated by a network element outside the media gateway blocked the CIC.

Table 3-7 Circuit Block Types (continued)

Type	Description
LOCMAN	Blocked manually using an MML command, such as **blk-cic**. You can remove this block by issuing the **unblk-cic** or **reset-cic** MML commands.
LOCUNK	Locally blocked for unknown reasons. This block indicates that a software problem possibly blocked the CIC but the software did not track the cause of the block.
MATE_UNAVAIL	Locally blocked on a nailed-up system because of a media gateway event (for example, the media gateway sent a group service message or the media gateway is out of service). If the associated switch does not respond to group unblock messages, the CICs stay in the MATE_UNAVAIL circuit block state. Your CICs should be in this state when you bring up the Cisco PGW 2200 Softswitch or media gateway. When the associated switch acknowledges the unblock message, the CICs transition from this state. If the CICs stay in the MATE_UNAVAIL circuit block state, troubleshoot the problem with the media gateway.
NONE	There is no block on the CIC. DS0 is available for use.
REMAUTO	Remotely blocked automatically.
REMMAN	Remotely blocked manually.

Note Block types are additive. For example, both LOCMAN (manually blocked locally) and REMMAN (manually blocked remotely) can be active at the same time.

Verifying System Statistics

You should monitor the Cisco PGW 2200 Softswitch system statistics daily. The system statistics provide the following information:

- Platform state
- Number of active alarms
- Current congestion level
- Call success and failure rates
- CPU utilization level
- Amount of available memory
- Disk usage

You can retrieve all the statistics for your system by entering the following MML command on the active Cisco PGW 2200 Softswitch:

```
rtrv-ne-health::all
```

The system returns a message like the following:

```
   MGC-01 - Media Gateway Controller 2008-10-07 03:22:49.444 EDT
M  COMPLD
```

```
   "Platform State:ACTIVE"
   "0 critical, 0 major, 0 minor active alarms"
   "Machine Congestion Level = MCL 0 (No Congestion), Reason: not applicable"
   "Current in progress calls = 0, half calls = 0, full calls = 0, call attempts= 0 cps"
   "CPU 0 Utilization = 0 % CPU 1 Utilization = 0 %"
   "Memory (KB): 5131609 Free virtual, 5872025 Total virtual, 2097152 Total real, 0 Total
Dial Plan"
   "Interval (minutes)           15      60      1440"
   "CALL: SuccCall TOT           0       0       0"
   "CALL: FailCall TOT           0       0       0"
   "CALL: SIPLicRej TOT          0       0       0"
   "CALL: H323LicRej TOT         0       0       0"
   "CALL: TDMLicRej TOT          0       0       0"
   "CALL: TimesTenLicRej TOT     0       0       0"
   "Filesystem            kbytes    used   avail capacity  Mounted on"
   "/dev/md/dsk/d3       1988623  500185 1428780    26%    /"
   "/dev/md/dsk/d12      57440581 9876786 46989390    18%    /opt"
   ;
```

Note The number of in-progress calls does not reflect the actual number of active calls. When an E1 link in a PBX comes up, CRMs are sent to the PBX for each channel to ensure that there are no active calls present in the PBX. The CRMs are sent to maintain synchronization after a link failure on the IP side. These CRMs are treated as active calls, which increases the number of in-progress calls returned by this command.

If over 80 percent of CPU resources are being used over an extended period, you should contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

If the response to the command indicates that the percentage of disk space capacity is at 90 percent or higher, you must delete files from your disk, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

Verifying the Number of Active Processes

You should check the number of active processes on the Cisco PGW 2200 Softswitch daily. To check, log into the active Cisco PGW 2200 Softswitch and use the following UNIX command:

```
ps -ef
```

The system returns a response similar to the following:

```
UID   PID  PPID  C    STIME TTY      TIME CMD
root     0     0  0 10:28:20 ?        0:00 sched
root     1     0  0 10:28:20 ?        0:27 /etc/init -
root     2     0  0 10:28:20 ?        0:00 pageout
root     3     0  0 10:28:20 ?        1:01 fsflush
root   174   173  0 10:29:03 ?        0:00 /usr/sbin/ntpdate -s -w 172.24.239.41
root   148     1  0 10:28:48 ?        0:00 /usr/lib/nfs/lockd
root   617     1  0 10:29:23 console  0:00 /usr/lib/saf/ttymon -g -h -p va-hoover console
login:  -T sun -d /dev/console -
root   237     1  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestend
root   116     1  0 10:28:36 ?        0:00 /usr/sbin/keyserv
root   114     1  0 10:28:36 ?        0:00 /usr/sbin/rpcbind
root   616     1  0 10:29:23 ?        0:00 /usr/lib/saf/sac -t 300
root   141     1  0 10:28:47 ?        0:00 /usr/sbin/inetd -s
daemon   146     1  0 10:28:48 ?        0:00 /usr/lib/nfs/statd
root   165     1  0 10:29:02 ?        0:11 /usr/lib/autofs/automountd
```

```
root   317     1  0 10:29:13 ?        0:00 /usr/sbin/rpc.bootparamd
root   169     1  0 10:29:02 ?        0:00 /usr/sbin/syslogd
root   173     1  0 10:29:02 ?        0:00 /sbin/sh /etc/rc2.d/S74xntpd start
root  2867   141  0 10:05:23 ?        0:00 in.telnetd
root   182     1  0 10:29:03 ?        0:00 /usr/sbin/cron
root   198     1  0 10:29:03 ?        0:00 /usr/lib/lpsched
root   227     1  0 10:29:05 ?        0:00 /usr/lib/utmpd
root   217     1  0 10:29:04 ?        0:00 /usr/lib/power/powerd
root   618     1  0 10:29:23 ?        0:00 /opt/CiscoMGC/bin/critagt -d
root   235     1  0 10:29:05 ?        0:00 /usr/lib/sendmail -bd -q15m
root   238   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 0
root   239   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 1
root   240   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 2
root   241   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 3
root   242   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 4
root   243   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 5
root   244   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 6
root   245   237  0 10:29:06 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 7
root   290     1  0 10:29:12 ?        0:00 /usr/sbin/vold
root   620   616  0 10:29:23 ?        0:00 /usr/lib/saf/ttymon
root   315     1  0 10:29:13 ?        0:01 /usr/sbin/in.rarpd -a
root   621   618  0 10:29:23 ?        0:05 /opt/CiscoMGC/bin/snmpdm -tcplocal -d
root   622   618  0 10:29:24 ?        0:00 /opt/CiscoMGC/bin/mib2agt -d
mgcusr   610     1  0 10:29:18 ?        0:02 procM
root   623   618  0 10:29:24 ?        0:00 /opt/CiscoMGC/bin/hostagt
root   624   618  0 10:29:24 ?        0:01 /opt/CiscoMGC/bin/fsagt
mgcusr   774   610  0 10:31:18 ?        0:17 ../bin/mmdbd -X 30007
mgcusr   626   610  0 10:29:24 ?        0:19 ../bin/LogServerd -X 30013
root   627   610  0 10:29:24 ?        0:05 ../bin/almM -X 30002
mgcusr   669   610  0 10:29:24 ?        0:08 ../bin/cdrDmpr -X 30005
mgcusr   637   610  0 10:29:24 ?        6:11 ../bin/amDmpr -X 30004
mgcusr   681   610  0 10:29:25 ?        0:11 ../bin/pom -X 30008
mgcusr   690   610  0 10:29:42 ?        0:02 ../bin/replicator -X 3000d -C ../
etc/XECfgParm.dat -t
mgcusr   670   610  0 10:29:24 ?        0:01 ../bin/cfgM -X 30001
mgcusr   673   610  0 10:29:25 ?        0:43 ../bin/measMgr -X 30003
mgcusr   689   610  0 10:29:42 ?        1:29 ../bin/engine -X 3000e
mgcusr   776   610  0 10:31:19 ?        0:01 ../bin/TCAP -X 30010
root   691   610  0 10:29:42 ?        0:01 ../bin/mmSAgt -X 30009
root   692   610  0 10:29:43 ?        0:04 ../bin/sagt -X 3000a
root   693   610  0 10:29:43 ?        0:01 ../bin/provSAgt -X 3000b
root   775   610  1 10:31:18 ?       37:37 ../bin/ioChanMgr -X 3000f
mgcusr   777   610  0 10:31:23 ?        0:12 ../bin/MGCP -X 30016
mgcusr   778   610  0 10:31:23 ?        0:27 ../bin/ISDNL3 -X 3000c
mgcusr   779   610  0 10:31:23 ?        0:26 ../bin/ISDNL3 -X 30011
mgcusr   780   610  0 10:31:23 ?        0:30 ../bin/ISDNL3 -X 30014
mgcusr   781   610  0 10:31:23 ?        0:01 ../bin/ISDNL3 -X 30015
mgcusr   782   610  0 10:31:23 ?        0:42 ../bin/SS7 -X 30017
root   783   610  0 10:31:23 ?        0:05 ../bin/foverd -X 30012
mgcusr2 5458  5456  0 11:07:28 pts/0    0:00 -tcsh
root  5456   141  0 11:07:28 ?        0:00 in.rlogind
root   367     1  0 14:21:02 ?        0:00 /usr/sbin/nscd
mgcusr  2869  2867  0 10:05:23 pts/1    0:00 -csh
root  3101  2869  0 10:06:49 pts/1    0:00 ps -ef
```

The response should indicate that there are between 60 and 100 processes active. If the response indicates that there are more than 100 active processes, you should contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

Verifying the Number of Users

You should check the number of users on the Cisco PGW 2200 Softswitch on a daily basis. To check, log into the active Cisco PGW 2200 Softswitch and enter the following UNIX command:

```
who
```

The system returns a response like the following:

```
mgcusr pts/0        May 29 11:07    (mgcusr-u5.somecompany.com)
mgcusr2 pts/1        May 30 10:05    (mgcusr2-u6.somecompany.com)
```

Only known login IDs should be listed in the response. If the response indicates that there are unknown login IDs, or login sessions that have lasted a very long time, you should contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

Verifying Available Virtual Memory

The operating system that is used on the Cisco PGW 2200 Softswitch, Solaris (Version 8 or 10), is a *virtual memory system*. A *virtual memory system* adds to the available memory by writing the contents of an unused block of memory to the disk. This data write to disk enables the system to use that block of memory for another purpose. The space on the disk that is dedicated to this function is called swap space. When the data in that block of memory is needed again, the system reads the stored block from the swap space back into memory.

In a typical Cisco PGW 2200 Softswitch installation, the tmp directory (/tmp) is a temporary file system mount that coexists in the same physical disk partition as the swap space. The system uses the tmp directory to run several special files, such as FIFOs, which the system requires to run properly. As the amount of space that is allocated to the tmp directory increases, the amount of space available for running Cisco PGW 2200 Softswitch processes decreases, which can cause functional problems. You need to minimize the amount of space that the tmp directory consumes.

Caution Do not copy other files into the /tmp directory, such as patches or other software. Use of this directory for temporary storage or for downloading can cause functional problems with the Cisco PGW 2200 Softswitch software.

To determine the amount of available virtual memory, you must compare the amount of virtual memory in use to the maximum amount of virtual memory for your system. To conduct this comparison, perform the following steps:

Note Be aware that the time of day when you enter these commands affects the overall accuracy of the response. If you enter these commands during your busiest hours, the amount of available virtual memory could be quite small. However, this reduction in virtual memory might not indicate a need to contact the Cisco TAC.

Consider performing this procedure during a period of less active call processing, to determine an average amount of available virtual memory.

The maximum amount of virtual memory is the sum of the physical memory and the size of the swap space. To determine the amount of physical memory on your system, complete the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch.

Step 2 Enter the following UNIX commands:

```
cd /usr/sbin
prtconf | grep Memory
```

The system returns a response like the following:

```
Memory size: 2048 Megabytes
```

Step 3 To determine the size of the swap space on the disk, enter the following UNIX command:

```
swap -s
```

The system returns a response like the following:

```
total: 235272k bytes allocated + 65912k reserved = 301184k used, 5471344k available
```

Step 4 Add the amount of physical memory to the amount of swap space. This value is the maximum virtual memory for your system.

Step 5 To determine the amount of available virtual memory, enter the following UNIX command:

```
vmstat
```

The system returns a response like the following:

```
kthr       memory             page            disk          faults      cpu
 r b w   swap  free  re  mf pi po fr de sr m1 m2 m3 m4 in   sy  cs us sy id
 0 0 0 5509624 1365192 0 0  0  0  0  0  0  0  0  0  405 252  318 0 0  100
```

The amount of swap and free memory that is listed in the response (5509624 and 1365192 in the preceding example) represents the total amount of available virtual memory. This amount should always be greater than 10 percent of the maximum virtual memory. If virtual memory is less than 10 percent, proceed to Step 5.

Note You can also use this command to check the available virtual memory repeatedly. Enter it in the format **vmstat** *n*, where *n* is the number of seconds between checks. See the man page for the **vmstat** command for more information.

When you enter the **vmstat** command to check the available virtual memory repeatedly, you should ignore the first line of output.

Step 6 Collect the system data that is described in the "Collecting System Data for Cisco TAC" section on page 6-93. Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Verifying Available Memory on the Cisco ITP-Ls

You should check the amount of available memory on your Cisco IP Transfer Point LinkExtenders (ITP-Ls) daily. To check, perform the following steps:

Step 1 Log in to a Cisco ITP-L, and enter the following Cisco IOS command to check the amount of available memory:

```
show mem
```

The system returns a response like the following:

```
                Head    Total(b)     Used(b)     Free(b)   Lowest(b) Largest(b)
Processor   80CF71E0    16813600     7885028     8928572     8900652 8891892
      I/O    1D00000    19922944     6975904    12947040    12938256 12937500
```

Ensure that the memory used is less than 90 percent of the total available memory. If memory use is less than 90 percent, the procedure is complete. If the response indicates that the Cisco ITP-L has a small amount of available memory, you might need to add additional memory to the Cisco ITP-L to manage call processing.

Note Be aware that the time of day when you enter this command will affect the overall accuracy of the response. If you enter this command during your busiest hours, the amount of available memory could be quite small. However, this memory reduction might not indicate a need to add additional memory.

Consider performing this procedure during a period of less active call processing, to determine an average amount of available memory.

Step 2 See the documentation for *Cisco 2800 Series Integrated Services Routers* for more information pertaining to memory requirements.

Periodic Maintenance Procedures

This section contains procedures that are performed either automatically, on a schedule, by the system, or that you perform regularly to maintain proper operation of the Cisco PGW 2200 Softswitch platform. Schedule the procedures that you must perform manually according to your own requirements. The maintenance procedures include the following:

- Automatic Disk Space Monitoring, page 3-24
- Automatic System Log Rotation, page 3-28
- Rotating System Logs Manually, page 3-28
- Creating a Disaster Recovery Plan, page 3-28
- Backing Up System Software, page 3-29
- Processing a Core Dump File, page 3-38

Note This section does not include information on maintaining the Sun host server hardware. You should routinely perform general maintenance tasks and diagnostic checks on the host hardware. See the documentation that Sun Microsystems (the hardware manufacture) provided, for detailed information on such procedures.

Automatic Disk Space Monitoring

The Cisco PGW 2200 Softswitch software includes a script that is called disk monitor (diskmonitor.sh). Disk monitor periodically checks the amount of disk space that is used within the configurable set of disk partitions. Disk monitor ensures that there is sufficient disk space available in each disk partition for the system to continue to operate at peak performance. Disk monitor deletes (trims) the older log files in the /opt/CiscoMGC/var/log and /opt/CiscoMGC/var/spool directories until the disk space usage is within the specified threshold (set using the XECfgParm.dat parameter, diskmonitor.Threshold).

The disk monitor can also track the number of configurations that are stored in the configuration library (which is found in the /opt/CiscoMGC/etc/CONFIB_LIB directory). Disk monitor trims the older configurations when the number of configurations exceeds the maximum value you set in the associated XECfgpParm.dat disk monitor parameter. The process manager runs the disk monitor script once every minute.

For prior releases, users were encouraged to ensure that no more than 64 configurations were stored in the configuration library. This recommendation was made to ensure the proper functioning of switchovers and the **prov-sync** MML command. If the system stores more than 64 configurations, switchovers and the **prov-sync** command time out and fail. Such timeouts and failures occur because the standby Cisco PGW 2200 Softswitch attempts to copy over all the configurations that are stored on the active Cisco PGW 2200 Softswitch.

Currently, the Cisco PGW 2200 Softswitch software automatically manages the process that administers the configuration library. You set the disk monitor parameter to establish the maximum number of configurations that are allowed in the configuration library. The system trims the older configurations as necessary.

The following parameters in the XECfgParms.dat file control the disk monitor:

- diskmonitor.Limit—Specifies the number of days to preserve data before the system trims data. The default value is 7.
- diskmonitor.OptFileSys—Allows monitoring of optional user-configurable file systems. This utility monitors the /opt file system for threshold crossing. Using this parameter, you can monitor additional file systems (disk slices) by setting the parameter to the preferred directory, such as /tmp, /usr or /var. The messages that are associated with this parameter are sent to the platform.log file. To retrieve these messages, you must scan the platform.log file for messages using the following format:

  Filesystem *file_system_name* has exceeded *num* percent full.

  The following sample log entry shows how a log entry might appear:

  ```
  Filesystem /var has exceeded 80 percent full
  ```

  Note Disk monitor does not trim files in these file systems.

- diskmonitor.Threshold—Specifies the percentage of disk usage that, when exceeded, generates a DISK alarm, and initiates disk trimming. The default value is 80.
- diskmonitor.CdrRmFinished—Specifies how many days to keep completed (polled) call detail record (CDR) files. The default value is 0. The default specifies that the Cisco BAMS polls the Cisco PGW 2200 Softswitch. The CDR.bin files remain in a user-configurable directory until the Cisco BAMS trims them (using the format CDR_*timestamp*.finished). Alternatively, the disk monitor trims the file from the user-configurable directory.

- diskmonitor.SoftLimit—Specifies the operation that the system performs when the system reaches the threshold number of days that is specified for the diskmonitor.Limit parameter. If this parameter is set to *true*, the disk monitor decrements the value in the diskmonitor.Limit parameter one day at a time (that is, from 7 to 6 to 5, and so on) until the disk utilization level drops below the percentage of disk set by the diskmonitor.Threshold parameter. If this parameter is set to *false*, the disk monitor closes when the system saves files continuously for the number of days set for the diskmonitor.Limit parameter or when disk usage reaches the percentage of use set for the diskmonitor. Threshold parameter. When disk monitor stops, the system generates a DISK alarm. The files can then be deleted manually. The default value is *false*.
- diskmonitor.CoreRmDays—Specifies the number of days to keep core dump files. The default value is 1, which means that core dump files are kept for one day before disk monitor removes them automatically.
- diskmonitor.CfgRmDirs—This parameter specifies the maximum number of configurations that can be stored in the configuration library. This parameter is not present in the XECfgParm.dat file initially. The valid values are the range of integers from 3 through 64. The default value is 64. Entering a value outside of the range of valid values disables monitoring of the number of entries that are stored in the configuration library. To change the value of this parameter, enter it manually into the XECfgParm.dat file.
- diskmonitor.PreserveCDRs—This parameter affects the performance of the disk monitor in coordination with the diskmonitor.Threshold, diskmonitor.Limit, and diskmonitor.SoftLimit parameters. If diskmonitor.PreserveCDRs is set to *true*, the system saves the CDR files during each stage of the disk monitor process. If diskmonitor.PreserveCDRs is set to *false*, the system manages the CDR files according to the settings of the diskmonitor.Threshold, diskmonitor.Limit, and diskmonitor.SoftLimit parameters. That is, the system will stop saving the CDR files when disk usage surpasses the percentage of use set by the diskmonitor.Threshold parameter.

Disk monitor performs the following steps in its inspection of disk utilization levels:

1. Verify that the standard and optional partitions, as defined in diskmonitor.OptFileSys, have not exceeded the thresholds for disk utilization or the configuration library, as defined in diskmonitor.Threshold and diskmonitor.CfgRmDirs, respectively.
   a. If neither threshold is exceeded, disk monitor exits.
   b. If the disk utilization threshold is exceeded, the disk monitor attempts to trim the files according to the number of days defined by the diskmonitor.Limit parameter. For instance, if diskmonitor.Limit is set to 7, the disk monitor deletes any files older than 7 days.
   c. If the configuration library threshold is exceeded, disk monitor trims the number of configuration files to match the setting in the diskmonitor.CfgRmDirs parameter, starting with the oldest.
2. Once files are trimmed, disk monitor verifies again that the standard and optional partitions have not exceeded the thresholds for disk utilization and the configuration library.
   a. If neither threshold is exceeded, disk monitor exits.
   b. If the disk utilization threshold is exceeded, and diskmonitor.SoftLimit is set to false, the system exits disk monitor and raises a DISK alarm.
   c. If the disk utilization exceeds the threshold, and diskmonitor.SoftLimit is set to *true*, the disk monitor begins decreasing the number of days for which logs can be stored (the value that is defined in diskmonitor.Limit), and stops as soon as disk utilization drops beneath the threshold specified by the diskmonitor.Threshold parameter.
   d. If the configuration library threshold is exceeded, disk monitor trims the number of configuration files to match the setting in the diskmonitor.CfgRmDirs parameter, starting with the oldest.

If any disk partition exceeds the configured usage threshold, the Cisco PGW 2200 Softswitch generates a DISK alarm (a major alarm). The DISK alarm warns of a disk partition overrun and of insufficient disk space. See the "DISK" section on page 6-38 for information about the corrective actions that are required to resolve a DISK alarm.

Disk monitor does not trim some other files, such as call trace files, which use large amounts of disk space. You might need to delete call trace files periodically. The system creates call trace files when you perform call traces while troubleshooting a problem. These files can be rather large. Leaving them on your disk could cause problems. For more information about deleting call trace files, see the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

Configuring Disk Monitor

You can configure the disk monitor only while the Cisco PGW 2200 Softswitch software is turned off. Therefore, you should configure disk monitor only during initial installation. For more information on configuring the disk monitor during initial installation, see the XECfgParms.dat section of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

To configure disk monitor after initial installation, perform the following steps:

Caution To perform the following procedure, turn off the Cisco PGW 2200 Softswitch software. Do not attempt the following procedure without the guidance of the Cisco TAC. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

If your system is a single Cisco PGW 2200 Softswitch in a simplex configuration, performing this procedure causes the system to drop all calls.

Step 1 Determine whether any alarms are pending on the active Cisco PGW 2200 Softswitch, as described in the "Retrieving All Active Alarms" section on page 6-3.

If any alarms are pending, you can determine the appropriate courses of action by searching for the corrective actions for those alarms in the "Alarm Troubleshooting Procedures" section on page 6-4. If the alarms are not in that section, corrective action is not required. For more information on those alarms, see the *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

Step 2 Repeat Step 1 for the standby Cisco PGW 2200 Softswitch.

Step 3 On each host, modify the disk monitor parameters in the XECfgParm.dat files. Use the procedure that is described in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

- diskmonitor.Limit parameter—Sets the number of days to preserve logged data before trimming. The default value is 7.
- diskmonitor.OptFileSys—Enables monitoring user-configurable file systems. This utility monitors the /opt file system for threshold crossing. Using this parameter, you can monitor additional file systems (disk slices) by setting the parameter to the preferred directory, such as /tmp, /usr, or /var. The system sends the messages that are associated with this parameter to the platform.log file. To retrieve these messages, you must scan the platform.log file for messages. The system presents the messages in the following format:

  Filesystem <*file_system_name*> has exceeded <*num*> percent full.

  The following sample output shows how a message appears:

  ```
  Filesystem /var has exceeded 80 percent full
  ```

Note Disk monitor does not trim the files in these file systems.

- diskmonitor.Threshold—Sets the percentage of disk usage. When disk usage exceeds the threshold, the system raises alarms and begins to trim files. The default value is 80.
- diskmonitor.CdrRmFinished—Specifies how many days to keep completed CDR files. The default value is 0. The default specifies that the Cisco BAMS polls the Cisco PGW 2200 Softswitch. The CDR.bin files remain in a user-configurable directory until the Cisco BAMS renames them (using the format CDR_*timestamp*.finished). Alternatively, the disk monitor trims the file from the user-configurable directory.
- diskmonitor.SoftLimit—Specifies the operation that the system performs when the system reaches the threshold number of days that is specified for the diskmonitor.Limit parameter. If this parameter is set to *true*, disk monitor decrements the value in the diskmonitor.Limit parameter one day at a time (that is, from 7 to 6, to 5, and so on) until the utilization level drops below the threshold. If this parameter is set to *false*, disk monitor closes and the system generates a DISK alarm. You can delete the files manually. The default value is *false*.
- diskmonitor.CoreRmDays—Specifies the number of days to keep core dump files in the log directory. The default value is 1, which means that core dump files are kept for one day before disk monitor removes them automatically.
- diskmonitor.CfgRmDirs—Specifies the maximum number of configurations that can be stored in the configuration library. This parameter is not present in the XECfgParm.dat file initially. The valid values are the range of integers from 3 through 64. The default value is 64. Entering a value outside of the range of valid values disables monitoring of the number of entries that are stored in the configuration library. To change the value of this parameter, you must enter it manually into the XECfgParm.dat file.

Caution The Cisco PGW 2200 Softswitch software is case-sensitive. Enter the parameter name correctly, or the system will not modify the maximum number of configurations.

Note Keep the latest configurations, store older configurations on system backups, and delete those older configurations from the library. For information on deleting configurations from the library, see the procedure in the "Using the Config-Lib Viewer" section on page 3-127.

Note To ensure the proper functioning of the **prov-sync** MML command, set the diskmonitor.CfgRmDirs parameter to a value between 50 and 60. Entering a value outside of the range of valid values (3 through 64) disables monitoring of the number of entries that are stored in the configuration library.

Automatic System Log Rotation

As the system operates, the Cisco PGW 2200 Softswitch software creates the system logs that are stored in a file in the /opt/CiscoMGC/var/log directory. The XECfgParm.dat file parameter sets the name of the system log file, logFileNamePrefix (the default value is *platform*). The Cisco PGW 2200 Softswitch software stops writing to the current system log file, archives the contents of that file, and commences writing to a new system log file. This process is referred to as *log rotation*.

Log rotation occurs because of one of the following conditions:

- Cisco PGW 2200 Softswitch software startup (the log rotation script is run)
- Log rotation script (log_rotate.sh) is run manually.
- Size of the active system log file exceeded the value that is set in the XECfgParm.dat parameter, fileRotateSize.
- Time elapsed since the last log rotation exceeded the value that is set in the XECfgParm.dat parameter, fileRotateInterval.

When the system rotates the system log file, it archives the current system log file and opens a new system log file. The system stores the archived log file in the /opt/CiscoMGC/var/spool directory. Once the Cisco PGW 2200 Softswitch software is operating, the log server takes over the actual file rotation function of renaming the active file to a historical file with a new filename. The filename is constructed according to the following format:

logFileNamePrefix_yyyymmddhhmmss.log, where the time stamp indicates the system date and time when the log is rotated.

Rotating System Logs Manually

You can also run the log rotation script manually to force the system to archive the current system log file. To run the script manually, log into the active Cisco PGW 2200 Softswitch as root, and enter the following UNIX command:

```
/opt/CiscoMGC/bin/log_rotate.sh
```

The system creates a new current system log file and archived log file, as described in the "Automatic System Log Rotation" section on page 3-28.

Creating a Disaster Recovery Plan

You should formulate a disaster recovery plan to ensure that you can restore the Cisco PGW 2200 Softswitch after it is forced out of service by a natural or man-made disaster. The plan should include regular backups of the system software.

See the "Backing Up System Software" section on page 3-29 for more information about backup operations. Store the backup data for your system in a secure location, in a site separate from the equipment, to ensure that the same disaster does not affect the backed up data.

For information on performing a disaster recovery, see the "Recovering from Cisco PGW 2200 Softswitch Failure" section on page 6-172.

Backing Up System Software

Schedule regular system software backups on both the active and standby Cisco PGW 2200 Softswitches to protect critical system data such as configuration files, which are irreplaceable if lost. If a catastrophic failure occurs, it is easier to restore system information from backup data than to recreate it.

Furthermore, if a failure occurs because the system software is not backed up, you will lose critical configuration information. Create a backup schedule. Perform small or incremental backups daily, and a large or complete backup once a week.

Note Back up your system software during periods of low call volume to minimize the effect of the backup on call processing.

The following section describes backup procedures:

- Backup Procedures for Cisco PGW 2200 Softswitch Software, page 3-30

Backup Procedures for Cisco PGW 2200 Softswitch Software

This backup method uses a script to back up the configuration data for the Cisco PGW 2200 Softswitch software, selected UNIX administrative files, and the Main Memory Database (MMDB). This script only performs complete backups. This script enables you to perform manual backups, schedule and administer automatic backups, and view a history of the last 30 backup operations.

Note If your Cisco PGW 2200 Softswitch is a continuous service system, ensure that you perform backup procedures on both Cisco PGW 2200 Softswitches.

Note You can run the various backup operations that are described in the following sections only when you are logged in to your system as *mgcusr*. You cannot perform any backup operation while you are logged in as *root*.

Note The procedures for restoring system data are in the "Restoring Procedures for Cisco PGW 2200 Softswitch Software" section on page 6-177.

The following sections provide the backup procedures:

- Performing a Manual Backup Operation, page 3-30
- Scheduling an Automatic Backup Operation, page 3-31
- Listing Scheduled Automatic Backup Operations, page 3-36
- Removing an Automatic Backup Operation from the Schedule, page 3-34
- Listing the Backup Operation History, page 3-37
- Performing a License Backup Operation (Release 9.7(3)), page 3-37

Performing a Manual Backup Operation

To perform a manual backup operation, enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -d path [-r retries -t retry_time]
```

Where:

- *path*—Complete path of the directory in which to store the backup file, for example a directory on a remote server that you have mounted on your system, or the local tape drive (the local tape drive is the default location).

  Note Do not store backup files on your local Cisco PGW 2200 Softswitch. Storing backup files on the local host reduces the amount of disk space available to process call data. Also, it does not ensure that the data is safe if a natural disaster occurs.

Note If the path you enter is for a tape device, you must enter a new tape into the device for each backup. The backup data on a used tape is overwritten by this operation.

- *retries*—Number of times to check for an active provisioning session on the Cisco PGW 2200 Softswitch, before aborting the backup operation. The default value is 0, and the maximum value is 100.

Note A backup operation cannot start while there is an active provisioning session on the Cisco PGW 2200 Softswitch.

- *retry_time*—Number of seconds to wait between checks for an active provisioning session on the Cisco PGW 2200 Softswitch. The default value is 30 seconds, and the maximum value is 3600 seconds.

For example, to perform a manual backup operation by which the backup file is saved to a directory path called /dev/rmt/h0, with a maximum of three attempts, each 60 seconds apart, enter the following UNIX command:

```
mgcbackup -d /dev/rmt/h0 -r 3 -t 60
```

Note You can enter **Ctrl-C** at any time to halt the execution of the mgcbackup script.

The backup file is stored in the specified directory path in the following format:

`mgc_hostname_yyyymmdd_hhmmss_backup`

Where:

- *hostname*—Name of the Cisco PGW 2200 Softswitch, such as MGC-01.
- *yyyymmdd*—Date on which the backup file is created, in a year-month-day format, such as 20011130.
- *hhmmss*—Time when the backup file is created, in an hour-minute-second format, such as 115923.

Scheduling an Automatic Backup Operation

To schedule an automatic backup operation, perform the following steps:

Note You can schedule an automatic backup operation only when you are logged in to your system as *mgcusr*. You cannot schedule an automatic backup operation while you are logged in as *root*.

Step 1 Enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -s
```

The system returns a response like the following:

```
Backup Schedule Menu
--------------------

1. Add a scheduled backup
2. Delete a scheduled backup
3. Delete all scheduled backups
4. List scheduled backups
5. Exit

Selection:
```

Note To exit the script at anytime, press **Ctrl-C.**

Step 2 Enter **1** to add an automatic backup operation to the schedule.

The system returns a response like the following:

```
Add a Scheduled Backup
----------------------

Enter the name of the backup:
```

Step 3 Enter the name of your backup.

Note The name of the backup must be 1 to 10 alphanumeric characters in length.

After you enter the name of your automatic backup, the system returns a response like the following:

```
Enter the directory to place the backup file (default=/dev/rmt/0):
```

Step 4 Enter the directory path where you want the backup file stored.

Note Your local tape drive is the default directory.

Note Do not store backup files on your local Cisco PGW 2200 Softswitch. Storing backup files on the local host reduces the amount of available disk space to process call data. Also, it does not ensure that the data is safe if a natural disaster occurs.

Note If the path you enter is for a tape device, you must enter a new tape into the device for each backup. The backup data on a used tape is overwritten by this operation.

After you enter your directory path, the system returns a response like the following:

```
Enter the number of retries (default=0):
```

Step 5 Enter the number of times to check for an active provisioning session on the Cisco PGW 2200 Softswitch before aborting the backup operation.

Note A backup operation cannot start while a provisioning session is active on the Cisco PGW 2200 Softswitch.

Note The maximum number of retries is 100.

After you enter the number of retries, the system returns a response like the following:

```
Enter the time between retries (default=30 seconds):
```

Step 6 Enter the number of seconds to wait between checks for an active provisioning session on the Cisco PGW 2200 Softswitch.

Note The maximum number of seconds between checks is 3600.

After you enter the time between attempts, the system returns a response like the following:

```
Enter the day of the week (default=everyday):
```

Step 7 Enter the day or days of the week on which you would like the backup operation performed. The following values are valid:

- SUNDAY
- MONDAY
- TUESDAY
- WEDNESDAY
- THURSDAY
- FRIDAY
- SATURDAY
- WEEKDAYS
- WEEKENDS
- EVERYDAY

After you enter the day or days of the week setting, the system returns a response like the following:

```
Enter the time (HH:MM):
```

Step 8 Enter the time at which you want to start the automatic backup operation, in hour:minute format.

Note The range for hour is from 00 to 23, and the range for minute is from 0 to 59.

Note Schedule your automatic backup operation for a time when your system is likely to have a minimum amount of call volume to minimize the effect of the backup on call processing.

After you enter the time setting, the system returns a response like the following:

```
Save this scheduled backup (Y or N)?
```

Step 9 Enter **Y** to add this automatic backup operation, or enter **N** if you do not want to add an automatic backup operation.

Note Press **Ctrl-C** at any time to halt the execution of the mgcbackup script.

The system returns a response like the following:

```
Press enter to continue:
```

Step 10 Press **Enter** to return to the backup schedule menu. You can either exit the utility or schedule another backup activity.

When the automatic backup operation runs, the backup file is stored in the specified directory path in the following format:

mgc_*hostname_yyyymmdd_hhmmss*_backup

Where:

- *hostname*—Name of the Cisco PGW 2200 Softswitch, such as MGC-01.
- *yyyymmdd*—Date on which the backup file is created, in a year-month-day format, such as 20011130.
- *hhmmss*—Time at which the backup file is created, in an hour-minute-second format, such as 115923.

Removing an Automatic Backup Operation from the Schedule

To remove an automatic backup operation from the schedule, perform the following steps:

Step 1 Enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -s
```

The system returns a response like the following:

```
Backup Schedule Menu
--------------------

1. Add a scheduled backup
2. Delete a scheduled backup
3. Delete all scheduled backups
4. List scheduled backups
5. Exit

Selection:
```

Step 2 Enter **2** to remove an automatic backup operation from the schedule.

The system returns a response like the following:

```
Delete a Scheduled Backup
-------------------------

NameRetriesTimeoutDayTimeDirectory
Back15  60  everyday12:00/var/cisco
Mybackup030weekdays04:00/var/cisco

Enter the name of the backup to be deleted:
```

Step 3 Enter the name of the automatic backup operation to remove from the schedule.

The system returns a response like the following:

```
Delete this scheduled backup (Y or N)?
```

Step 4 Enter **Y** to delete an automatic backup operation, or enter **N** if you do not want to delete an automatic backup operation.

Note Press **Ctrl-C** at any time to halt the execution of the mgcbackup script.

The system returns a response like the following:

```
Scheduled backup name deleted.

Press enter to continue:
```

Where *name* is the name of the deleted scheduled backup, as specified in Step 3.

Step 5 Press **Enter** to return to the backup schedule menu. You can either exit the utility or schedule another backup activity.

Removing all Automatic Backup Operations from the Schedule

To remove all of the automatic backup operations from the schedule, perform the following steps:

Step 1 Enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -s
```

The system returns a response like the following:

```
Backup Schedule Menu
--------------------

1. Add a scheduled backup
2. Delete a scheduled backup
3. Delete all scheduled backups
4. List scheduled backups
5. Exit

Selection:
```

Step 2 Enter **3** to remove all automatic backup operations from the schedule.

The system returns a response like the following:

```
Delete all Scheduled Backups
----------------------------

NameRetriesTimeoutDayTimeDirectory
Back15  60  everyday12:00/var/cisco
Mybackup030weekdays04:00/var/cisco

Delete all scheduled backups (Y or N)?
```

Step 3 Enter **Y** to continue to delete all automatic backup operations, or enter **N** if you do not want to delete all automatic backup operations.

Note Press **Ctrl-C** at any time to halt the execution of the mgcbackup script.

The system returns a response like the following:

```
All scheduled backups deleted.

Press enter to continue:
```

Where *name* is the name of the deleted scheduled backup, as specified in Step 3.

Step 4 Press enter to return to the backup schedule menu. You can either exit the utility or schedule another backup activity.

Listing Scheduled Automatic Backup Operations

To list the scheduled automatic backup operations, perform the following steps:

Step 1 Enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -s
```

The system returns a response like the following:

```
Backup Schedule Menu
--------------------

1. Add a scheduled backup
2. Delete a scheduled backup
3. Delete all scheduled backups
4. List scheduled backups
5. Exit

Selection:
```

Step 2 Enter **4** to list the scheduled automatic backup operations.

The system returns a response like the following:

```
Scheduled Backups
-----------------

NameRetriesTimeoutDayTimeDirectory
Back15  60  everyday12:00/var/cisco
Mybackup030weekdays04:00/var/cisco

Press enter to continue:
```

Step 3 Press enter to return to the backup schedule menu. You can either exit the utility or schedule another backup activity.

Listing the Backup Operation History

To see a history of the last 30 backup operations, perform the following steps:

Step 1 Enter the following UNIX command on the Cisco PGW 2200 Softswitch:

```
mgcbackup -l
```

The system returns a response like the following:

```
Status  File
Success /var/Cisco/mgc_venus_20011010_153003_backup
Success /var/Cisco/mgc_venus_20011011_153003_backup
Success /var/Cisco/mgc_venus_20011012_153003_backup

Press enter to continue:
```

Note If a backup operation fails, the reason for the failure is listed beneath the filename.

Step 2 Press enter to return to the backup schedule menu. You can either exit the utility or schedule another backup activity.

Performing a License Backup Operation (Release 9.7(3))

On Cisco PGW 2200 Softswitch Release 9.7(3), you must perform a license backup operation to back up the software license.

Note You receive Cisco PGW 2200 Softswitch license files by email. If you already performed the license backup, ignore this operation.

To back up a license on the Cisco PGW 2200 Softswitch, you must copy all the files under /opt/CiscoMGC/license to a secure location. To restore the license files on the Cisco PGW 2200 Softswitch, you must copy these saved license files back to the /opt/CiscoMGC/license folder.

Note To install the Cisco PGW 2200 Softswitch software on a new machine, you must contact Cisco TAC for another license file.

Processing a Core Dump File

If a system crash occurs on the Cisco PGW 2200 Softswitch, the system might generate core dump files, which are stored in the $BASEDIR/var directory. You can review the core dump files as part of the diagnosis process, to determine what caused the system to crash. The system periodically searches the $BASEDIR/var directory for core dump files.

When the system identifies a core dump file, it performs the following steps:

- Determines which executable dumped the core.
- Finds the current time of the system.
- Renames the core dump file, inserting the executable that dumped the core and the date and time that the file was identified, using the following format:

  core.*execname_yyyymmddhhmms*

  For example, if the failover daemon process (foverd) dumped the core on August 17, 2001 at 12:29:37, the core dump file is named as follows:

  core.foverd_20010817122937
- Raises a crash information collected alarm.

Note The process manager processes the core dump file when it receives a signal from a failed child process. If the process manager dumps the core file, it does not perform the preceding steps.

Regular Operations

This section contains procedures that you can perform on the Cisco PGW 2200 Softswitch. The following sections describe the regular operations:

- Managing MML Sessions, page 3-39
- Managing Signaling Channels, page 3-42
- Managing Bearer Channels, page 3-52
- Managing SIP Communications, page 3-60
- Provisioning a Cisco PGW 2200 Softswitch, page 3-64
- Managing a Cisco PGW 2200 Softswitch Platform, page 3-95
- Managing System Measurements, page 3-105
- Managing Call Detail Records, page 3-118
- Using the Cisco MGC Viewer Toolkit, page 3-119

Managing MML Sessions

The following sections describe the operations that you can use to manage an MML session:

- Displaying Previously Entered MML Commands, page 3-39
- Displaying Information About MML Commands, page 3-40
- Re-entering Previously Entered MML Commands, page 3-41
- Retrieving Active MML Sessions, page 3-42
- Ending an MML Session, page 3-42

Displaying Previously Entered MML Commands

Use the **h** MML command to redisplay an MML command or a series of MML commands, depending on the number or range that you enter. If you do not enter a number or range, the system displays the last MML command that was entered.

To redisplay the last MML command that was entered, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **h** command.

```
h
```

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "RTRV-TC:ALL"
   /* command 1 */
```

To redisplay a particular MML command that you entered, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **h::***number* command:

Where *number* is the number of the MML command you want to display. The last MML command that you entered is 1; the command you entered before that is 2, and so on.

For example, to redisplay the 10th-most-recently entered MML command, enter the **h::10** command.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "RTRV-C7LNK:ALL"
   /* command 10 */
```

To redisplay a range of MML commands that you entered, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **h::** *start_num*, *end_num* command.

Where:

- *start_num*—Number of the first MML command you want to display. The last MML command that you entered is 1; the command you entered before that is 2, and so on.
- *end_num*—Number of the earliest MML command you want to display.

For example, to redisplay all of the commands from the second to the 5th-most-recently entered MML commands, enter the **h::2, 5** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "RTRV-C7LNK:ALL"
```

```
   /* command 5 */
   "RTRV-SOFTW:ALL"
   /* command 4 */
   "RTRV-TC:ALL"
   /* command 3 */
   "STP-AUD"
   /* command 2 */
```

Displaying Information About MML Commands

Use the **help** MML command to display information on all MML commands or detailed information on individual commands. To display information on a specific MML command, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **help:** *command_name* command.

Where *command_name* is the name of the MML command for which you want information.

For example, if you want information on the **set-log** MML command, enter the **help:set-log** command:

The system returns a response like the following:

```
   MGC-01 - Media Gateway Controller 2008-10-07 04:22:17.894 EDT
M  COMPLD

   set-log
------------------------------------------------------------

Purpose:
--------
Set Logging Level of a process or all processes.


Syntax:
-------
set-log:<proc>:<log level>[,mcl="mcl"][,confirm]
set-log:all:<log level>[,mcl="mcl"][,confirm]



Command Description:
proc -- The various actively and passively monitored processes running on the Cisdisplay
all processes.
log level -- Sets the logging level for the specified process.  Logging levels are as
follows:
-  CRIT  -- Critical level messages.
-  ERR   -- Error condition messages.
-  WARN  -- Warning condition messages.
-  INFO  -- Informational messages.
-  TRACE -- Trace messages.
-  DEBUG -- Debug-level messages (lowest level). A CONFIRM parameter is required for the
DEBUG log level. Do not set this log level unless directed to by the TAC.
mcl -- Machine Congestion Level.

Logging at any given level implies upper levels are included.  In other words, setting the
INFO logging level also sets the WARN, ERR, and CRIT levels.  The order of the levels
shown above can also be viewed as a verbosity level, in that at CRIT the least information
is logged, and at DEBUG the most information is logged.


Input Description:
------------------
```

```
There are multiple targets/components for this command. To get target/component specific
help select from one of the following targets/components.

 :
all :


Output Description:
-------------------
all :


Examples:
---------
The MML command shown in the following example sets the logging level of PM-01 process to
DEBUG:

mml> SET-LOG:PM-01:DEBUG
Media Gateway Controller - MGC-01 2000-01-16 09:38:03
M CMPLD
"PM-01:DEBUG"
;


Comments:
---------
This command was introduced in Release 7.4 and replaces the CHG-LOG command.

Note that the process manager (PM-01) is not included in the "all" parameter, because it
is a special process. The logging level of PM-01 must be set individually, as in the
example above.
Also, the DSKM-01 and LOG-01 (the disk monitor and log server processes, respectively) do
not accept log-level change requests.

   ;
```

Re-entering Previously Entered MML Commands

Use the **r** MML commandto re-enter an MML command, either a specific MML command or the last MML command you entered.

To re-enter the last MML command that you entered, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **r** command:

The system returns a response appropriate to the previously entered command. For example, if the previously entered command was **rtrv-spc:all**, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-08 10:20:38
M  RTRV
   "sigsrv1:DPC=244.001.045,DNW=2:OPC=244.001.004:AOOS"
   "sigsrv2:DPC=244.018.030,DNW=2:OPC=244.001.004:AOOS"
   "sigsrv3:DPC=244.018.031,DNW=2:OPC=244.001.004:AOOS"
   "sigsrv4:DPC=244.018.032,DNW=2:OPC=244.001.004:AOOS"
   "sigsrv5:DPC=244.018.033,DNW=2:OPC=244.001.004:AOOS"
```

To re-enter a particular MML command that you entered, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **r::***number* command:

Where *number* is the number of the MML command you want to re-enter. The last MML command that you entered is 1, the command that you entered before that is 2, and so on.

For example, to re-enter the 10th-most-recently entered MML command, enter the following command:

```
r::10
```

The system returns a response appropriate to the previously entered command.

Note You can also use the up arrow key to re-execute a previously entered MML command.

Retrieving Active MML Sessions

To retrieve information on the active MML sessions, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-mml** command.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2008-10-17 04:37:17.586 EDT
M  RTRV

   mml1: mgcusr
```

The response lists the session number (mml1 in the example) and the user ID of the session owner (mgcusr in the example).

Ending an MML Session

Use the **quit** MML command to end your current MML session.

Managing Signaling Channels

Signaling channels are bidirectional transport mechanisms for call-control signaling between the Cisco PGW 2200 Softswitch and other devices, such as the Cisco ITP-Ls, that provide necessary delivery reliability for higher-layer protocols. All types of signaling channels have basically the same functionality and are managed similarly. Unless otherwise noted, all commands, counters, and alarms apply to all types of signaling channels.

The basic types of signaling channels on the Cisco PGW 2200 Softswitch are:

- SS7 Message Transfer Part (MTP)—Used for reliable delivery. MTP level 2 provides point-to-point delivery. MTP level 3 maintains multiple load-sharing links and multiple routes between SS7 point codes.
- SS7 MTP over IP (SS7/IP)—MTP level 2 is terminated on the Cisco ITP-L. MTP level 3 is backhauled to the Cisco PGW 2200 Softswitch with the Reliable User Datagram Protocol (RUDP) that is proprietary to Cisco.
- Facility Associated Signaling (FAS)—Found in ISDN PRI or DPNSS over a 64-Kbps channel. Some form of Link Access Protocol (LAP), for example Q.921, provides reliable delivery.
- FAS over IP (FAS/IP)—Same as FAS, but uses IP as its transport mechanism. Q.921 LAPD or RUDP/SM provides reliable delivery.
- Media Gateway Control Protocol (MGCP)—Signaling channel, which uses UDP/IP, provides reliable delivery.

The following sections describe the information that the system returns when you retrieve signaling channel data using MML commands.

Signaling channel name

The first field lists the MML name of the signaling channel.

Parent Name

The second field lists the MML name of the parent of the signaling channel or linkset.

Link ID

The LID field lists the associated link identification number.

Subsystem Number

The SSN field lists the associated subsystem number.

Primary Service State

The PST field shows the current primary service state of the signaling channel on the local Cisco PGW 2200 Softswitch. Table 3-8 lists the valid primary service state values:

Table 3-8 Signaling Channel Primary Service States

Link State ID	Link State	Description
AOOS	Automatically out-of-service	System has taken the signaling channel out-of-service (OOS).
INB	Install busy	When a system is first configured, all signaling links default to this state and must be manually set to in-service (IS) by using the **set** MML commands.
IS	In-service	Signaling channel is IS and fully operational. This state is its normal operating state.
MOOS	Manually out-of-service	Signaling channel has been manually taken OOS.
OFF_DUTY	Off duty	State of signaling channels when a retrieve command is entered on the standby Cisco PGW 2200 Softswitch. The current service state is maintained only on the active Cisco PGW 2200 Softswitch.
OOS	Out-of-service	Signaling channel is OOS from the remote end. The system is actively trying to restore the signaling channel. The links on the standby Cisco PGW 2200 Softswitch are always OOS (with a secondary service state of STBY) because the current service state is maintained only on the active Cisco PGW 2200 Softswitch.
TRNS	Transient	State of the signaling channel is currently being changed.
UNK	Unknown	State of the signaling channel is not known.

Secondary Service State

The SST field shows the current secondary service state of the specified signaling channel on the local Cisco PGW 2200 Softswitch. The valid states are presented in the following list:

- ACKD—SS7 Acknowledgement delay
- BSNR—SS7 backward sequence number received (BSNR)
- CIS—Commanded in service
- CONF—Configuration failure
- COOS—Commanded out of service
- ENGR—Call engine reset
- ISPEND—In service, pending
- LCNG—Congestion, local
- LINE—Line failure
- LINH—SS7 local inhibit
- LINK—Link failure
- LINS—Linkset failure
- NA—Cause not available
- OOSPEND—Out of service, pending
- PRHB—SS7 prohibited
- RBLK—SS7 remote blocked
- RCNG—Congestion, remote
- RINH—SS7 remote inhibit
- RSTR—SS7 restricted
- SERR—SS7 signal error
- STBY—Host is in the standby state
- SUPPENT—Supporting entity
- TPATH—Traffic path
- UNK—Cause unknown

The following sections describe the operations that you can use to manage signaling channels:

Note To ensure that you are retrieving the correct service states of the signaling channels, always perform the following retrieval procedures on the active Cisco PGW 2200 Softswitch. The current service states of the signaling channels are maintained only on the active Cisco PGW 2200 Softswitch. If you retrieve the service state of a signaling channel on the standby Cisco PGW 2200 Softswitch, the system always returns a message that indicates that the links are out-of-service because of the host being in the standby state (i.e., `"c7link1:ls01,LID=0:OOS,STBY"  /* Link 1 in Linkset 1 */).` Such a message does not indicate that the signaling channel itself is out-of-service. If a switchover occurs, the service state for each signaling channel remains the same as the standby Cisco PGW 2200 Softswitch assumes the active role.

- Retrieving Signaling Service States, page 3-45
- Retrieving Service State of C7/SS7 Links or Linksets, page 3-45
- Retrieving the Service State for IP Links, page 3-46
- Retrieving the Service State for IP Routes, page 3-46
- Retrieving the Service State of D-Channels, page 3-47

- Retrieving the State of SS7 Signaling Services, page 3-48
- Retrieving the State of SS7 Routes, page 3-49
- Retrieving the State of All Local Subsystem Numbers, page 3-49
- Retrieving the Service State for Associations, page 3-50
- Clearing TCAP Transactions, page 3-51
- Enabling Group Service Reset Messages, page 3-51

Retrieving Signaling Service States

Retrieving state information about your signaling services is a task that performed daily. For more information about this task and other daily task, see the "Daily Tasks" section on page 3-1.

To retrieve information about a specific signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-dest:** ***sig_srv*** command:

Where *sig_srv* is the MML name of a signaling service**.**

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 14:53:03
M  RTRV
   "sigsrv1:PKG=SS7-ANSI,ASSOC=SWITCHED,PST=IS,SST=RCNG"
```

For more information on the response to this command, see the "Understanding the Signaling Service State Information" section on page 3-10.

If the destination is in a primary service state other than IS, attempt to bring it into service, as described in the "Setting the Service State of a Signaling Service" section on page 6-103.

Note If the **rtrv-dest** MML command is entered after a switchover has occurred, the state of some of the signaling services might be listed as undefined (UND). UND is the default state for a signaling service when the system starts. In this instance, UND states indicate that the Cisco PGW 2200 Softswitch has not received a service state message for the associated signaling service since the switchover occurred. No user action is required.

Retrieving Service State of C7/SS7 Links or Linksets

To retrieve the service state for an individual SS7 link, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-c7lnk:** ***C7_linkname*** **|** ***c7_linksetname*** command:

For example, to retrieve the service state for an SS7 link called c7link1, enter the command:

```
rtrv-c7lnk:c7link1
```

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "c7link1:ls01,LID=0:IS"  /* Link 1 in Linkset 1 */
```

To retrieve service state for all of the SS7 links, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-c7lnk: all** command:

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV
   "c7link1:ls01,LID=0:IS"  /* Link 1 in Linkset 1 */
   "c7link2:ls01,LID=1:IS"  /* Link 2 in Linkset 1 */
   "c7link3:ls02,LID=0:IS"  /* Link 1 in Linkset 2 */
   "c7link4:ls02,LID=1:IS"  /* Link 2 in Linkset 2 */
```

The valid service states for a C7/SS7 link are identical to the primary service state listings for signaling channels, as found in the "Managing Signaling Channels" section on page 3-42. If the link is in any other state than IS, attempt to bring the linkset into service, as described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105.

Retrieving the Service State for IP Links

To retrieve the service state for an individual IP link, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-iplnk:*iplink_name*** command:

For example, to retrieve the service state of an IP link called iplink1, enter the following command:

```
rtrv-iplnk:iplink1
```

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "iplink1:IS"
```

To retrieve attributes for all of the IP links, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-iplnk:all** command:

The system returns a message like the following, which shows the IP links to and from the Cisco PGW 2200 Softswitches and the associated media gateways (different solutions might use different media gateways).

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV
   "iplink1:OOS
   "iplink2:OOS
   "iplink3:OOS
   "iplink4:OOS
   "iplink5:OOS
   "iplink6:OOS
```

The valid service states for an IP link are identical to the primary service state listings for signaling channels, as found in the "Managing Signaling Channels" section on page 3-42. If the link is in any other state than IS, attempt to bring the linkset into service, as described in the "Setting the Service State of an IP Link" section on page 6-105.

Retrieving the Service State for IP Routes

To retrieve the service state for an individual IP route, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-iproute:*iproute_name*** command:

For example, to retrieve the service state of an IP route called iprte1, enter the following command:

```
rtrv-iproute:iprte1
```

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "iprte1:IS"
```

To retrieve attributes for all of the IP routes, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-iproute:all** command:

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV
   "iprte1:IS
   "iprte2:IS
```

The valid service states for an IP route are described in the following sections. If the route is in any other state than IS, attempt to bring it into service, as described in the "Setting the Service State of an IP Route" section on page 6-106.

IP Route Primary Service States

The PST field shows the current primary service state of the IP route. Table 3-9 lists the valid primary service state values:

Table 3-9 IP Route Primary Service States

Link State ID	Link State	Description
IS	In-service	Route is IS and fully operational. This state is its normal operating state.
OOS	Out-of-service	Route is OOS. The system is actively trying to restore the link.

IP Route Secondary Service States

The SST field shows the current secondary service state of the specified IP route. Table 3-10 lists the valid secondary service state values:

Table 3-10 IP Route Secondary Service States

Link State ID	Link State	Description
CONF	Configuration	Route is OOS because of a configuration failure.
COOS	Commanded out-of-service	Route has been commanded OOS by the operator.
OFF_DUTY	Off duty	Route is available for use, but not currently being used.
STBY	Standby	Routes on the standby Cisco PGW 2200 Softswitch.

Retrieving the Service State of D-Channels

To retrieve the service state for an individual D-channel, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-dchan:*dchan_name*** command:

For example, to retrieve the service state for the D-channel that is called dchan-1, enter the following command:

```
rtrv-dchan:dchan-1
```

When the D-channel is associated with an FAS signaling path, the system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "dchan-1:fas1,LID=0:IS"
   ;
```

In this response, **fas1** is the signaling path, or a logical grouping of D-channels (equivalent to a linkset). The LID is the line identifier, or the logical line ID of the D-channel within the signaling path (equivalent to the SLC in SS7). **IS** is the primary service state of the D-channel.

When the D-channel is associated with an NFAS signaling path, the system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "dchan-1:nfas1,LID=0:PRI,backup=dchan-2:STBY"
   ;
```

In this response, **nfas1** is the signaling path, or a logical grouping of D-channels (equivalent to a linkset). The LID is the line identifier, or the logical line ID of the D-channel within the signaling path (equivalent to the SLC in SS7). The next field indicates whether the specified D-channel is the primary (PRI) channel or the standby (STBY). Finally, the backup field specifies the MML name of the D-channel that is configured as the backup to the specified D-channel. This field is displayed only when a backup D-channel has been provisioned. For information on provisioning backup D-channels, see the *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

To retrieve the service state for all of the D-channels, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-dchan:all** command:

The system returns a message like the following, which shows the signaling links to and from the Cisco PGW 2200 Softswitches and the associated media gateways (different solutions might use different media gateways).

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV
   "dchan1:nfas1,LID=0:IS"
   "dchan2:nfas1,LID=1:IS"
   "dchan3:fas1,LID=0:IS"
```

The valid service states for a D-channel are identical to the primary service state listings for signaling channels, as found in the "Managing Signaling Channels" section on page 3-42. If the link is in any other state than IS, attempt to bring the linkset into service, as described in the "Setting the Service State of a D-channel" section on page 6-106.

Retrieving the State of SS7 Signaling Services

To retrieve the current state for an SS7 signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-spc:*ss7_sig_srv*** command:

Where *SS7_sig_srv* is the MML name for the associated SS7 signaling service.

The system returns a response like the following:

```
   MGC-01 - Media Gateway Controller 2001-06-12 16:10:21
M  RTRV
   "ss7sigsrv1:DPC=244.001.041,DNW=2:OPC=244.001.005:AOOS"
```

To retrieve the current state for all of your SS7 signaling services, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-spc:all** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 16:04:59
M  RTRV
   "ss7sigsrv1:DPC=244.001.045,DNW=2:OPC=244.001.004:IS"
   "ss7sigsrv2:DPC=244.018.030,DNW=2:OPC=244.001.004:IS"
   "ss7sigsrv3:DPC=244.018.031,DNW=2:OPC=244.001.004:IS"
   "ss7sigsrv4:DPC=244.018.032,DNW=2:OPC=244.001.004:IS"
   "ss7sigsrv5:DPC=244.018.033,DNW=2:OPC=244.001.004:IS"
```

The valid service states for a signaling service are found in the "Understanding the Signaling Service State Information" section on page 3-10. If the signaling service is in any other state than IS, attempt to bring it into service, as described in the "Setting the Service State of an SS7 Signaling Service" section on page 6-104.

Retrieving the State of SS7 Routes

To retrieve the current state for an SS7 route, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-rte:*dpc*** command:

Where *dpc* is the MML name for the associated destination point code (DPC).

The system returns a response like the following:

```
   MGC-01 - Media Gateway Controller 2001-06-12 16:17:55
M  RTRV
   "dpc1:linkset1,APC=244.001.040,PRIO=1,PST=AOOS,SST=NA"
```

To retrieve the current state for all of SS7 routes, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-rte:all** command:

The system returns a response like the following:

```
   MGC-01 - Media Gateway Controller 2001-06-12 16:15:51
M  RTRV
   "dpc1:linkset1,APC=244.001.040,PRIO=1,PST=AOOS,SST=NA"
   "dpc2:linkset2,APC=244.001.041,PRIO=1,PST=AOOS,SST=NA"
   "dpc4:linkset4,APC=244.001.044,PRIO=1,PST=AOOS,SST=NA"
   "dpc5:linkset5,APC=244.001.045,PRIO=1,PST=AOOS,SST=NA"
   "dpc8:linkset8,APC=244.018.030,PRIO=1,PST=AOOS,SST=NA"
   "dpc9:linkset9,APC=244.018.031,PRIO=1,PST=AOOS,SST=NA"
   "dpc10:linkset10,APC=244.018.032,PRIO=1,PST=AOOS,SST=NA"
   "dpc11:linkset11,APC=244.018.033,PRIO=1,PST=AOOS,SST=NA"
```

The valid service states for a linkset are identical to the primary service state listings for signaling channels, as found in the "Managing Signaling Channels" section on page 3-42. If the linkset is in any other state than IS, attempt to bring the linkset into service, as described in the "Setting the Service State of a Signaling Service" section on page 6-103.

Retrieving the State of All Local Subsystem Numbers

To retrieve the state of all local subsystem number (SSNs), log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-lssn:all** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "TCAP-01:SSN=1,PST=IS"
   "TCAP-01:SSN=2,PST=OOS"
```

The response indicates the name of the associated process, the SSN, and the state (either in-service or out-of-service). If any of the local SSNs are out of service, proceed to the "Setting the Service State of a Local Subsystem Number" section on page 6-107.

Retrieving the Service State for Associations

To retrieve the service state for an individual association, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-association:*assoc_name*** command:

For example, to retrieve the service state of an association called assoc1, enter the following command:

```
rtrv-association:assoc1
```

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 20:26:18
M  RTRV
   "assoc1:IS"
```

To retrieve attributes for all of the associations, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-association:all** command:

The system returns a message like the following:

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV
   "assoc1:OOS
   "assoc2:OOS
   "assoc3:OOS
   "assoc4:OOS
```

The valid service states for an association are described in the following sections. If the association is in any other state than IS, attempt to bring it into service, as described in the "Resolving an Association Alarm" section on page 6-122.

Association Primary Service States

The PST field shows the current primary service state of the association. Table 3-11 lists the valid primary service state values:

Table 3-11 Association Primary Service States

Link State ID	Link State	Description
INB	Install busy	When a system is first configured, all associations default to this state and must be manually set in-service (IS) by using the **set-iplnk** MML command.
IS	In-service	Association is IS and fully operational. This state is its normal operating state.
OOS	Out-of-service	Association is OOS. The system is actively trying to restore the association.

Association Secondary Service States

The SST field shows the current secondary service state of the specified association. Table 3-12 lists the valid secondary service state values:

Table 3-12 Association Secondary Service States

Link State ID	Link State	Description
CONF	Configuration	Association is OOS because of a configuration failure.
COOS	Commanded out-of-service	Association has been set to OOS by the operator.
STBY	Standby	Association on the standby Cisco PGW 2200 Softswitch.

Retrieving TCAP Transactions

To retrieve the number of active transaction capabilities application part (TCAP) transactions, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-tcap-trans** command:

The system returns a response like the following:

```
   Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "TCAP-01:TRANS=0"
```

Clearing TCAP Transactions

To clear all TCAP transactions that are older than a specified period, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **clr-tcap-trans::*t=number*** command:

Where *number* is the time period, in seconds, after which you want to clear TCAP transactions.

For example, to clear all TCAP transactions that are older than 60 seconds, enter the following command:

```
clr-tcap-trans::t=60
```

Enabling Group Service Reset Messages

Occasionally, you might want to modify the properties of an SS7 signaling service to enable your system to send SS7 group service reset (GSR) messages for all CICs during point code initialization. Modifying these properties can enable the Cisco PGW 2200 Softswitch to synchronize its bearer channel blocking state with the blocking state of the end office. The process of modifying the properties of a signaling service is referred to as dynamic reconfiguration. For more information about dynamic reconfiguration, see the "Understanding Dynamic Reconfiguration" section on page 3-67.

Caution Do not enable the Cisco PGW 2200 Softswitch to send GSR messages.

Note You can use the CMM or the VSPT to enable the sending of GSR messages on your system. See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information about using the CMM or VSPT to modify the properties of an SS7 signaling service.

To enable the sending of GSR messages, perform the following steps:

Step 1 Start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to set the property that enables the sending of GRS messages for CICs during point code initialization:

```
prov-ed:ss7path:name="comp_name",GRSEnabled=true
```

Where:

comp_name—MML name for the SS7 signaling service that you want to send GRS messages.

For example, to enable the sending of GRS messages on an SS7 signaling service named **ss7svc1**, enter the following command:

```
prov-ed:ss7path:name="ss7svc1",GRSEnabled=true
```

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Managing Bearer Channels

The operations that you can use to manage an MML session are described in the following sections:

- Verifying Proper Replication of Calls, page 3-52
- Retrieving the States of Bearers Held By a Media Gateway, page 3-53
- Retrieving DPNSS Virtual Bearer Channel Status, page 3-59
- Blocking CICs, page 3-55
- Retrieving the Administrative State, page 3-55
- Retrieving DPNSS Virtual Bearer Channel Status, page 3-59

Verifying Proper Replication of Calls

Perform the steps in the following procedure to ensure that the standby Cisco PGW 2200 Softswitch becomes fully operational and that it is replicating calls in progress completely:

Caution The following command retrieves the status of *all* provisioned traffic channels. If you have many traffic channels, consider limiting the command to a subset of the provisioned channels, perhaps according to signaling-service-by-signaling-service. For example, to see just the provisioned channels for a signaling service named ss7svc2, enter the following command: **rtrv-tc:name="ss7svc2"**.

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-tc:all** command:

Depending on the release of the Cisco PGW 2200 Softswitch software you are running and the type of configuration you are using on the associated media gateway, the system returns a different set of responses.

When the Cisco PGW 2200 Softswitch software is configured for signaling, the system returns a response like the following:

```
Media Gateway Controller - MGC-67 2000-04-05 08:08:12
M  RTRV
   "c7s-1:CIC=1,PST=IS,CALL=IDLE,BLK=NONE"
   "c7s-1:CIC=2,PST=IS,CALL=IDLE,BLK=NONE"
   "c7s-1:CIC=3,PST=IS,CALL=IDLE,BLK=NONE"
   "c7s-1:CIC=4,PST=IS,CALL=IN,BLK=NONE"
   "c7s-1:CIC=5,PST=IS,CALL=IN,BLK=NONE"
   "c7s-1:CIC=6,PST=IS,CALL=IN,BLK=NONE"
   "c7s-1:CIC=7,PST=IS,CALL=IN,BLK=NONE"
   "c7s-1:CIC=8,PST=IS,CALL=IN,BLK=NONE"
   "c7s-1:CIC=9,PST=IS,CALL=IN,BLK=NONE"
```

When the Cisco PGW 2200 Softswitch software is configured for call control, the system returns a response like the following:

```
   Media Gateway Controller - MGC-04 2000-04-05 08:05:54
M  RTRV
   "c7s-1:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=2,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=3,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=4,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=5,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=6,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=7,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=8,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "c7s-1:CIC=9,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

Note An explanation of the fields in the response can be found in the "Understanding CIC States" section on page 3-16.

Step 2 Repeat Step 1 on the standby Cisco PGW 2200 Softswitch.

Step 3 Verify that the CICs in both systems are in sync and show the same status.

Calls in progress should say CALL=IN for both systems.

If necessary, you can force the active Cisco PGW 2200 Softswitch to do a maintenance switchover (see the "Performing a Manual Switchover" section on page 3-96) and repeat the preceding procedure for that system.

Caution Switchover operations cause the loss of all SS7 messages that are transmitted to the Cisco PGW 2200 Softswitch for approximately 3 seconds. This switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Retrieving the States of Bearers Held By a Media Gateway

You can retrieve the states of bearer channels being held by a media gateway. To retrieve the state of a group of bearer channels that are associated with one or more signaling destinations that are being held by a media gateway, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-tc-held:sig_dest| *&sign_dest*...**command:

Where *sig_dest* is a logical signaling destination, such as an SS7 point code, FAS path, IP FAS path, or DPNSS path.

When none of the group of bearer channels that are associated with the specified signaling destinations are being held by a media gateway, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 16:28:39
M  RTRV
   "ss7svc1"
   /* No bearer channels in held state */
```

When bearer channels that are associated with the specified signaling destinations are being held by a media gateway, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 16:28:39
M  RTRV
   "ss7svc1:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=2,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=3,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=4,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=5,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=6,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=7,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=8,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=9,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

To retrieve the state of all bearer channels that are held by a media gateway, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-tc-held:all** command:

When none of the bearer channels are being held by a media gateway, the system returns a response like the following:

```
Retrieving results.  This could take a few moments...
   MGC-01 - Media Gateway Controller 2001-06-12 16:28:39
M  RTRV
   "ss7svc1"
   /* No bearer channels in held state */
   "ss7svr2"
   /* No bearer channels in held state */
```

When bearer channels are being held by a media gateway, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 16:28:39
M  RTRV
   "ss7svc1:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=2,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=3,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=4,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=5,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=6,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=7,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=8,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc1:CIC=9,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=10,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=11,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=12,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=13,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=14,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=15,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=16,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
   "ss7svc2:CIC=17,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

```
"ss7svc2:CIC=18,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

Blocking CICs

You might need to block a CIC or a range of CICs on your Cisco PGW 2200 Softswitch. Blocking a single CIC sends a BLA message to the destination SSP. Blocking a range of CICs sends a CGB message to the destination SSP. The range option only can be used to block CICs within a given trunk (T1 or E1).

To block a single CIC, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **blk-cic:*sig_srv*:CIC=*number*** command:

Where:

- *sig_srv*—MML name of a signaling service that is associated with the CIC you want to block.
- *number*—Number of the CIC you want to block.

For example, to block CIC number 1, which is associated with a signaling service called ss7svc1, enter the **blk-cic:ss7svc1:cic=1** command:

To block a range of CICs, log in to your active Cisco PGW 2200 Softswitch, start an MML session, and enter the **blk-cic:*sig_srv*:CIC=*number*,RNG=*range*** command:

Where:

- *sig_srv*—MML name of a signaling service that is associated with the CICs you want to block.
- *number*—Number of the first CIC in the range of CICs you want to block.
- *range*—Specifies the end of the range of CICs to block.

Note You can configure the Cisco PGW 2200 Softswitch software to issue individual or group supervision messages for point codes that are associated with an ISUP signaling service. ISUP signaling services issue group supervision messages by default. If you configure an ISUP signaling service to issue individual supervision messages, use of the *range* option issues individual supervision messages for each CIC in the range, instead a single group supervision message.

For example, to block CIC number 1 through 20, which are associated with a signaling service called ss7svc1, enter the following command:

```
blk-cic:ss7svc:cic=1,rng=20
```

To verify that the CICs have been successfully blocked, retrieve the status of the affected CICs as described in the "Verifying CIC States" section on page 3-15. When you want to return the CICs to service, you must unblock the CICs as described in the "Unblocking CICs" section on page 6-139.

Retrieving the Administrative State

The administrative state refers to the state of CICs (on the Cisco PGW 2200 Softswitch) and spans bearer channels (on the associated media gateway). There are three possible states: locked, unlocked, and shutdown. Use the **rtrv-admin-state** MML command to determine the administrative state of several objects in the Cisco SS7 solution environment, including the Cisco PGW 2200 Softswitch, an associated MGCP media gateway, a trunk group, a signaling service, spans and bearer channels that are associated with a signaling service (for non-ISUP trunks), and CICs associated with a signaling service (for ISPU trunks).

When you retrieve the administrative state of an object that consists of groups of CICs or spans bearer channels, you receive an inferred target state that is based on the following criteria:

- If all circuits are in a locked state, the inferred target administrative state is locked.
- If at least one circuit is in an unlocked state, the inferred target administrative state is unlocked.
- If the circuits are in a mixture of the locked and shutdown states, the inferred target administrative state is shut down.

To change the administrative state of a component, see the "Setting the Administrative State" section on page 6-124.

The following procedures describe how you can use the rtrv-admin-state MML command:

- Retrieving the Administrative State of a Cisco PGW 2200 Softswitch, page 3-56
- Retrieving the Administrative State of a Media Gateway, page 3-56
- Retrieving the Administrative State of a Trunk Group, page 3-56
- Retrieving the Administrative State of a Signaling Service, page 3-57
- Retrieving the Administrative State of Spans, page 3-57
- Retrieving the Administrative State of CICs, page 3-59

Retrieving the Administrative State of a Cisco PGW 2200 Softswitch

To retrieve the administrative state of a Cisco PGW 2200 Softswitch, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*mgc*** command:

Where *mgc* is the MML name of the Cisco PGW 2200 Softswitch.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "mgca:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the Cisco PGW 2200 Softswitch, see the "Setting the Administrative State of a Cisco PGW 2200 Softswitch" section on page 6-124.

Retrieving the Administrative State of a Media Gateway

To retrieve the administrative state of an associated media gateway, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*gateway*** command:

Where *gateway* is the MML name of the associated media gateway.

Note Not all media gateway types are applicable. Supported types are CU, MUX, and MGW external nodes.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "mgw1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the media gateway, see the "Setting the Administrative State of a Media Gateway" section on page 6-125.

Retrieving the Administrative State of a Trunk Group

To retrieve the administrative state of a trunk group, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*trkgrp*** command:

Where *trkgrp* is the MML name of the trunk group.

Note This command can only be used for time-division multiplexing (TDM) trunk groups. Allow the corresponding MML name for component type "0020".

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "trunkgrp1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the trunk group, see the "Setting the Administrative State of a Trunk Group" section on page 6-125.

Retrieving the Administrative State of a Signaling Service

To retrieve the administrative state of a signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*sig_srv*** command:

Where *sig_srv* is the MML name of the signaling service. The following signaling service types are valid for this command:

- For in-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
- For in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
- For in-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
- Signaling service or routeset that is associated with a DPC.
- EISUP signaling service.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "ss7svc1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the signaling service, see the "Setting the Administrative State of a Signaling Service" section on page 6-126.

Retrieving the Administrative State of Spans

To retrieve the administrative state of a single span, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*sig_srv*,span=x** command:

Where:

- *sig_srv* is the MML name of the signaling service. The following signaling service types are valid for this command:
  - For in-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - For in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.

  - For in-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.

For example, to determine the administrative state of span number 2 that is associated with a signaling service called ss7svc1, enter the **rtrv-admin-state:ss7svc1,span=2** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "ss7svc1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To retrieve the administrative state of a bearer channel or a range of bearer channels in a span, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*sig_srv*,span=x,bc=y[,rng=*range*]** command:

Where:

- *sig_srv* is the MML name of the signaling service. The following signaling service types are valid for this command:
  - For in-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - For in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - For in-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.
- *y*—Numeric value that identifies the non-ISUP bearer channel number.
- *range*—Value such that *y*+*range* is a valid bearer channel number. The system retrieves the administrative state for all bearer channels between *y* and *y*+*range*.

For example, to determine the administrative state of bearer channel numbers 2 through 6, associated with a signaling service called ss7svc1, enter the **rtrv-admin-state:ss7svc1,span=2,bc=2,rng=5** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "ss7svc1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the spans, see the "Setting the Administrative State of Spans" section on page 6-127.

Retrieving the Administrative State of CICs

To retrieve the administrative state of a CIC or a range of CICs, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*sig_srv*,cic=*number*[,rng=*range*]** command:

Where:

- *sig_srv* is the MML name of the signaling service. The following signaling service types are valid for this command:
  - For in-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - For in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - For in-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *number*—Valid CIC number.
- *range*—Value such that *y+range* is a valid CIC number. The system retrieves the administrative state for all CICs between *y* and *y+range*.

For example, to determine the administrative state of CICs 2 through 11 associated with a signaling service called ss7svc1, enter the **rtrv-admin-state:ss7svc1,cic=2,rng=9** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-03 2000-02-17 14:27:52
M  COMPLD
   "ss7svc1:PST=UNLOCK,LOCK=0,UNLOCK=384,SHUTDOWN=0"
```

To change the administrative state of the CICs, see the "Setting the Administrative State of CICs" section on page 6-128.

Retrieving DPNSS Virtual Bearer Channel Status

You can retrieve the status of DPNSS virtual bearer channels by issuing the **rtrv-vir-tc** command. The rtrv-vir-tc command displays the same output as the **rtrv-tc** command except that it eliminates the SPAN and GW_STAT fields.

To retrieve the status of DPNSS virtual bearer channels, enter the **rtrv-virt-tc:dpnss-path** MML command:

Where:

- *VTC*—Virtual channel number.
- CALL—Status of the call: IDLE, IN, or OUT (call direction).
- PST—Primary state. Valid values are:
  - AOOS—Resource has been taken out of service by the system.
  - INB—Installed busy (resource has been created but not yet commanded IS or OOS with the **SET-DEST** command).
  - IS—In service.

  - MOOS—Manually taken out of service.
  - OOS—Out of service.
  - TRNS—Transient. The state is currently being changed.
  - UNK—Unknown.
- BLK—Blocking state
  - NONE—There is no block on the CIC. DS0 is available for use.
- TRANS—Number of active transactions.

The MML command shown in the following example displays information for a DPNSS virtual bearer channel:

```
mml> rtrv-virt-tc:dpnss-path-1:

   MGC-01 - Media Gateway Controller 2009-01-19 13:36:14.202 CST
M  RTRV
   "dpnss-path-1:VTC=33,CALL=IDLE,PST=IS,BLK=NONE"
   "dpnss-path-1:VTC=34,CALL=IDLE,PST=IS,BLK=NONE"
   "dpnss-path-1:VTC=35,CALL=IDLE,PST=IS,BLK=NONE"
   "dpnss-path-1:VTC=36,CALL=IDLE,PST=IS,BLK=NONE"
   "dpnss-path-1:VTC=37,CALL=IDLE,PST=IS,BLK=NONE"
   "dpnss-path-1:VTC=38,CALL=IDLE,PST=IS,BLK=NONE"
```

Managing SIP Communications

The Cisco PGW 2200 Softswitch software supports SIP call control. You can use many of the procedures that are defined for signaling channels and bearer channels to manage SIP communications. Use the following procedures strictly for managing SIP communications:

- Managing the DNS Cache, page 3-60
- Retrieving SIP Call Information, page 3-62

Managing the DNS Cache

When you have provisioned the Cisco PGW 2200 Softswitch to function as a Session Initiation Protocol (SIP) endpoint, you might need to manage the content of the DNS cache.

Displaying the Contents of the DNS Cache

To display the contents of the DNS cache, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch.

Step 2 Start an MML session.

Step 3 Enter the **sta-dns-info:*sippath_name*: "URL | *cache_entry_name* | *null_string*"** command:

Where:

- *sippath_name*—MML name of the SIP signaling service that is associated with the DNS cache.
- *URL*—Associated world-wide-web (www) address. If you enter the associated URL in this command, the command in Step 4 displays the IP address and the time-to-live (TTL) values.
- *cache_entry_num*—DNS cache entry number. If you enter the associated cache entry number in this command, the command in Step 4 displays the URL, IP address, and TTL values.

- *null_string*—An empty string (entered as **" "** in the command line). If you enter a null string in this command, the command in Step 4 displays the DNS IP addresses, size of the cache, percentage of the cache being used, and the local TTL value.

For example, to start a DNS Information Request for the cache that is associated with the signaling service, *sipsigpath*, enter one of the following commands:

```
sta-dns-info:sipsigpath:"sipphone1.cisco.com"
sta-dns-info:sipsigpath:"10"
sta-dns-info:sipsigpath:""
```

Step 4 Request the contents of the specified DNS cache that is associated with an SIP signaling service. To issue this request, enter the **rtrv-dns-info:*sippath_name*** command:

Where: *sippath_name*—MML name of the SIP signaling service that you entered in Step 1.

If you entered the associated URL along with name of the SIP signaling service in Step 1, the system returns a message like the following.

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV

   IP address = 193.12.174.56
   TTL = 240
```

If you entered the associated cache entry number along with the name of the SIP signaling service, the system returns a message like the following.

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV

   URL = sipphone3.cisco.com
   IP address = 193.12.174.56
   TTL = 240
```

If you entered a null string along with the name of the SIP signaling service, the system returns a message like the following.

```
   Media Gateway Controller 2000-03-26 19:23:23
M  RTRV

   DNS 1 address 193.12.77.2
   DNS 2 address 193.21.9.76
   Cache size = 280
   Cache usage = 81
   Local TTL = 240   ;
```

Purging the Contents of the DNS Cache

To purge the DNS cache, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-dns-purge:*sippath_name*** command:

Where:

sippath_name—MML name of the SIP signaling service that is associated with the DNS cache.

For example, to purge the DNS cache that is associated with the signaling service, *sipsigpath*, enter the **sta-dns-purge:sipsigpath** command:

Retrieving SIP Call Information

From Release 9.3(2) to Release 9.5(2)

Starting in Release 9.3(2), you can use the **rtrv-sip** MML command to retrieve call information data, such as SIP call identification number, and the originating and terminating numbers, for any call that uses SIP for at least one end of the call. The following sections describe how to use the command to retrieve SIP call information.

To retrieve information about calls that use SIP for at least one end of the call, log in to the active Cisco PGW 2200 Softswitch, and enter the **rtrv-sip:*type* [timerperiod=*min* | detail]** command:

Where:

type—Signaling service type can be one of the following:

- all—Displays all calls that use SIP for at least one end of a call.
- tdm—Displays calls that use SS7, ISDN, or other protocols of this type on the other end of a call (one end of the call is always SIP).
- ip—Displays calls that use EISUP or H.323 on the other end of a call (one end of the call is always SIP).
- sip—Displays calls that use SIP on both ends of a call (a SIP-to-SIP call)

- *min*—Optional parameter to limit the content of the response to calls that have durations over the specified period, in minutes. For example if you entered the parameter as timerperiod=120, the response to this command would be limited to calls of the specified type that are over 120 minutes in duration.

Note If you find SIP-to-SIP calls that have excessive durations, you can cancel those calls using the procedure that is described in the "Stopping SIP-to-SIP Calls" section on page 6-155.

- detail—Optional parameter to provide the calling (from) and the called (to) number for the specified type of calls.

The standard version of this command returns a response that indicates the SIP call identification name and the protocol type that is used on the other end of the call. The protocol type can be one of the following:

- TDM—Used when the other end of the call is SS7, ISDN, or other protocols of this type
- IP—Used when the other end of the call is EISUP or H.323
- SIP—Used when the other end of the call is SIP (a SIP-to-SIP call)

When you enter the standard version of this command, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2002-05-13 10:02:08.833 PST
M  RTRV
   "sip-sigpath:CID=10177b4e1aed3d8679b40d824a72e2e9@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=SIP"
   "sip-sigpath:CID=10177b4e1aed3d8679b40d824a72e2e9@172.22.119.82,"
   "sip-sigpath:CALL=IN,MATE_FAMILY=SIP"
   "sip-sigpath:CID=1febf77f5ba699047c1251194a4cd23c@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=SIP"
   "sip-sigpath:CID=1febf77f5ba699047c1251194a4cd23c@172.22.119.82,"
   "sip-sigpath:CALL=IN,MATE_FAMILY=IP"
   "sip-sigpath:CID=257df6bc34dcec346102c00233b68b34@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=IP"
```

When you enter this command with the optional command to provide detailed call data, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2002-05-13 10:02:08.833 PST
M  RTRV
   "sip-sigpath:CID=10177b4e1aed3d8679b40d824a72e2e9@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=SIP,FROM=2025553230,TO=4080000284"
   "sip-sigpath:CID=10177b4e1aed3d8679b40d824a72e2e9@172.22.119.82,"
   "sip-sigpath:CALL=IN,MATE_FAMILY=SIP,FROM=2025553230,TO=4080000284"
   "sip-sigpath:CID=1febf77f5ba699047c1251194a4cd23c@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=SIP,FROM=2025555589,TO=4080000439""sip-sigpath:CID=1f
    ebf77f5ba699047c1251194a4cd23c@172.22.119.82,"
   "sip-sigpath:CALL=IN,MATE_FAMILY=IP,FROM=2025555589,TO=4080000439"
   "sip-sigpath:CID=257df6bc34dcec346102c00233b68b34@172.22.119.82,"
   "sip-sigpath:CALL=OUT,MATE_FAMILY=IP,FROM=2025559602,TO=4080000205"
```

From Release 9.6(1) to Release 9.7(3)

Starting in Release 9.6(1), use the **rtrv-callinfo** command to display the call IDs of all EISUP/SIP calls on the system.

Note See "RTRV-CALLINFO—Display Call IDs of EISUP/SIP (Release 9.6(1))" in Chapter 2 of *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* at http://www.cisco.com/en/US/docs/voice_ip_comm/pgw/9/command/reference/mmlref_1.html

To retrieve information about calls that use SIP for at least one end of the call, log in to the active Cisco PGW 2200 Softswitch, and enter the **rtrv-callinfo:*target* [:*mateprottype*][,*calltime*][,detail]** command:

Where:

- *target*—Signaling service type can be one of the following:
  - all—Displays all calls that use SIP for at least one end of a call.
  - MML names for SIP or EISUP signaling service.
- *mateprottype*—Signaling service type can be one of the following:
  - all—Displays all calls that use SIP or EISUP on both ends of a call.
  - sip—Displays calls that use SIP on both ends of a call (a SIP-to-SIP call) or calls use EISUP for EISUP-SIP calls.
  - eisup—Displays calls that use SIP on both ends of a call (a SIP-to-SIP call) or calls use EISUP for EISUP-EISUP calls.
  - tdm—Displays calls that use SIP on both ends of a call (a SIP-to-SIP call) or calls that use SS7, ISDN, or other protocols of this type on the other end of a call (one end of the call is always SIP).
  - ip—Displays calls that use SIP on both ends of a call (a SIP-to-SIP call) or calls that use EISUP or H.323 on the other end of a call (one end of the call is always SIP).
- *calltime*—Optional parameter to limit the content of the response to calls that have durations over the specified period, in minutes. For example if you entered the parameter as timerperiod=120, the response to this command would be limited to calls of the specified type that are over 120 minutes in duration.
- detail—Optional parameter to provide the calling (from) and the called (to) number for the specified type of calls.

When you enter this command with the optional command to provide detailed call data, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2002-05-13 10:02:08.833 PST
M  RTRV
   "sippath-sip-outbound:CALL=OUT,MATE_FAMILY=SIP,FROM=3330000,TO=sipp"
   "sippath-sip-outbound:CID=5248672-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=IN,MATE_FAMILY=SIP,FROM=sipp,TO=3330000"
   "sippath-sip-outbound:CID=5248672-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=OUT,MATE_FAMILY=SIP,FROM=3330000,TO=sipp"
   "sippath-sip-outbound:CID=5248673-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=IN,MATE_FAMILY=SIP,FROM=sipp,TO=3330000"
   "sippath-sip-outbound:CID=5248673-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=OUT,MATE_FAMILY=SIP,FROM=3330000,TO=sipp"
   "sippath-sip-outbound:CID=5248674-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=IN,MATE_FAMILY=SIP,FROM=sipp,TO=3330000"
   "sippath-sip-outbound:CID=5248674-32474@10.0.120.3,"
   "sippath-sip-outbound:CALL=OUT,MATE_FAMILY=SIP,FROM=3330000,TO=sipp"
   "sippath-sip-outbound:CID=5248675-32474@10.0.120.3,"
```

Provisioning a Cisco PGW 2200 Softswitch

The following sections describe the operations that you can use to provision the Cisco PGW 2200 Softswitch:

- Starting a Provisioning Session, page 3-64
- Saving and Activating your Provisioning Changes, page 3-65
- Ending a Provisioning Session Without Activating your Changes, page 3-66
- Invoking Dynamic Reconfiguration, page 3-66
- Retrieving Provisioning Data, page 3-69
- Provisioning a Dial Plan, page 3-75
- Importing Provisioning Data, page 3-75
- Exporting Provisioning Data, page 3-76
- Managing Automatic Congestion Control, page 3-77

For more detailed information about provisioning the Cisco PGW 2200 Softswitch, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide.*

Starting a Provisioning Session

To start a provisioning session, log into the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-sta::srcver="*curr_ver*",dstver="*mod_ver*"** command:

Where:

- *curr_ver*—Name of the current configuration version. In place of the name of the current configuration version, you can also enter:
  - new—New default configuration session; no existing source configuration is available.
  - active—Selects the active configuration as the source for configuration changes.

Note You can use *new* as the source configuration only when there is no existing, active set of provisioning data in the configuration library. Therefore, you cannot use *new* as the source configuration once a provisioning session has been saved and activated by using **prov-cpy** or **prov-dply**. After you have saved and activated a set of data, you must use either *active* or the name of the set of provisioning data as the source configuration.

Note If you do not know the name of your current configuration session, you can use the CONFIG-LIB viewer in the MGC toolbar to determine that name. For more information on the CONFIG-LIB viewer, proceed to the "Using the Config-Lib Viewer" section on page 3-127.

- *mod_ver*—New configuration version name that contains your provisioning changes.

For example, to use a configuration version called **ver1** as the basis for a version that you want to call **ver2**, enter the following command:

```
prov-sta::srcver="ver1",dstver="ver2"
```

Once a provisioning session is underway, you may use the **prov-add**, **prov-ed**, or **prov-dlt** MML commands to add, modify, and delete components on your system. To add components to your system, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*. To modify or delete components on your system, see the "Invoking Dynamic Reconfiguration" section on page 3-66.

There are two ways to close your provisioning session: save and activate your provisioning changes or end your provisioning session without saving and activating your changes. For more information on saving and activating your provisioning changes, see the "Saving and Activating your Provisioning Changes" section on page 3-65. For more information on ending your provisioning session without saving and activating your changes, see the "Ending a Provisioning Session Without Activating your Changes" section on page 3-66.

Saving and Activating your Provisioning Changes

When you have completed making provisioning changes in your session, you must enter a command to save and activate your changes. There are two different provisioning MML commands that save and activate changes: **prov-cpy** and **prov-dply**.

Caution Using the **prov-cpy** and **prov-dply** MML commands can severely impact your system call processing performance, depending on the extent of your provisioning changes. Enter these commands only during a maintenance window when traffic is minimal.

The **prov-cpy** MML command saves and activates your changes on the active Cisco PGW 2200 Softswitch. Typically, this command is used to save and activate changes on a Cisco PGW 2200 Softswitch in a simplex configuration. However, you can use the **prov-cpy** MML command on Cisco PGW 2200 Softswitches in high-availability or continuous-service configurations, to save and activate your changes on the active Cisco PGW 2200 Softswitch. If you use prov-cpy, you should enter the **prov-sync** MML command immediately afterwards to save and activate your changes on the standby Cisco PGW 2200 Softswitch.

Note To add new signaling links or CICs to the signaling links and CICs previously provisioned, enter the **prov-cpy** command. To save the new signaling links and CICs to the standby Cisco PGW 2200 Softswitch, enter the **prov-sync** command. The link and call state data are not synchronized. To ensure that the link and call state data are synchronized, reboot the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch after the **prov-sync** command completes the synchronization.

Caution Using the **prov-sync** MML command can severely impact your system call processing performance. Enter the **prov-sync** command during a maintenance window when traffic is minimal.

Note When you use the **prov-sync** MML command to synchronize the provisioning settings on the standby Cisco PGW 2200 Softswitch with current settings on the active Cisco PGW 2200 Softswitch, the system does not indicate when the synchronization process has failed.

Note When you enter the **prov-cpy** command, the provisioning session automatically ends. To make additional provisioning changes, start a new provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Enter the **prov-dply** MML command to save and activate your changes on the active and standby Cisco PGW 2200 Softswitches. Typically, you use this command to save and activate changes on Cisco PGW 2200 Softswitches in high-availability or continuous-service configurations. Do not use this command on a Cisco PGW 2200 Softswitch in a simplex configuration.

Note When you enter the **prov-dply** command, your provisioning session automatically ends, unless an error occurs during execution. To make additional provisioning changes, start a new provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Ending a Provisioning Session Without Activating your Changes

To end a provisioning session, without saving and activating the changes made during your session, enter the **prov-stp** MML command. This command ends the current provisioning session and the changes are not entered.

Invoking Dynamic Reconfiguration

You can dynamically reconfigure, that is modify or delete, selected components that you have provisioned on the Cisco PGW 2200 Softswitch. The following procedure lists the sequence of actions you must perform (actual steps to take depend on the provisioning tool you use):

Note For more information on which components can be dynamically reconfigured, see the "Understanding Dynamic Reconfiguration" section on page 3-67.

Step 1 Start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the **prov-ed** or **prov-dlt** MML commands to change or delete a component. See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on the specific structure of the command for the component type you want to reconfigure dynamically.

Note To change or delete a component, you might have to meet certain preconditions, such as changing the service state of the component to *OOS* using MML commands (as mentioned in Table 3-13).

Step 3 Repeat Step 2 for each component that you want to modify or delete. See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for provisioning guidelines.

Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 4 After completing a dynamic reconfiguration operation on the Cisco PGW 2200 Softswitch, you must issue a service message from the associated media gateway to invoke the changes throughout your SS7 solution.

Note See the documentation that is associated with your media gateway for more information on issuing service messages.

Understanding Dynamic Reconfiguration

Dynamic reconfiguration is a function in the Cisco PGW 2200 Softswitch software that allows you to modify or delete Cisco PGW 2200 Softswitch components while the Cisco PGW 2200 Softswitch software is still in service. You can perform dynamic reconfiguration without shutting down or restarting either the Cisco PGW 2200 Softswitch software or the Sun host platform.

The following list presents the Cisco PGW 2200 Softswitch component types that you can dynamically reconfigure. You cannot dynamically reconfigure any other component types.

- CICs
- Point codes (DPC, originating point code [OPC], or APC)
- Physical interfaces (TDM, ATM, or Ethernet)
- Signaling links (TDM, ATM, or SS7)
- Signaling services
- SS7 subsystems
- SS7 routes
- Trunk groups
- Component properties (linksets, signaling services, and trunk groups)

Table 3-13 lists the preconditions that you must establish for the component before you can perform any modification or deletion as part of dynamic reconfiguration. There are no preconditions for adding components as part of dynamic reconfiguration.

Table 3-13 Dynamic Reconfiguration Preconditions

Component	Preconditions
CICs	Call state of the CIC must be *IDLE* (see the "Verifying CIC States" section on page 3-15) and the service state of the associated DPC must be set to *OOS* (see the "Setting the Service State of a Signaling Service" section on page 6-103). or Block type for the CIC must be set to locally blocked (see the "Blocking CICs" section on page 3-55) and the associated media gateway span and time slot must be set to *OOS (*see the documentation for the media gateway).
Point codes (DPC, OPC, or APC) and SS7 routes	Service state of the point code and SS7 route must be set to *OOS* (see the "Setting the Service State of a Signaling Service" section on page 6-103).
Signaling links (TDM, ATM, or SS7)	Service state of the signaling link must be set to *OOS* (see the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105).
Signaling services	Service state of the signaling service must be set to *OOS* (see the "Setting the Service State of an SS7 Signaling Service" section on page 6-104).
SS7 subsystems	Service state of the subsystems and routes must be set to *OOS* (see the "Setting the Service State of a Local Subsystem Number" section on page 6-107).
Trunk groups Component properties (linksets, signaling services, and trunk groups)	None.

For example, to change the settings for a DPC or remove it altogether, you must first set the service state of the DPC to OOS, before attempting to make changes. If you do not set the service state to OOS, your dynamic reconfiguration request is rejected with an error message.

During dynamic reconfiguration, the system goes through two phases. First, it validates the service states of all objects being changed. If any error is encountered, no reconfiguration takes place on any of the objects. Error messages indicate which components are in error. The format of the error message is "*Component's MML name*, *process rejecting change*, *reason for rejecting the change*, *remedy.*"

If no errors are encountered during the validation phase, the update phase proceeds. In this phase, all of the processes load the new configuration data. At the beginning of the update phase, the system displays an SNMP alarm to indicate that the update is starting. At the end of the update phase, the alarm clears, and if MML initiated commit or deploy, the system returns the MML response.

To change the current configuration of a component using dynamic reconfiguration, you can use only the provisioning tools that are provided with the Cisco PGW 2200 Softswitch, MML provisioning commands, or an SNMP provisioning agent (such as the Cisco Voice Services Provisioning Tool (Cisco VSPT)).

Provisioning or configuring by using any other means can cause errors during the dynamic reconfiguration process. Using these tools is required because the dynamic reconfiguration process relies on the provisioning tools to validate the data values and, more importantly, to cross check the dependencies of the objects. For example, the provisioning tool ensures that adding a signal transfer point (STP) first requires the existence of the associated route.

Retrieving Provisioning Data

You can use the **prov-rtrv** MML command to retrieve information about your current provisioning settings. The following sections describe how to use this command to retrieve provisioning data:

- Retrieving Data for an Individual Component, page 3-69
- Retrieving Data for Select Components, page 3-71
- Retrieving Data for All Components of a Particular Type, page 3-72
- Retrieving Data on the Current Provisioning Session, page 3-73
- Retrieving Data on Supported Signaling Protocols, page 3-73

Retrieving Data for an Individual Component

You can retrieve provisioning data on any individual component on your system. To retrieve provisioning data, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:*component*:name=*MML_name*** command:

Where:

- *component*—MML component type that is associated with the desired component. You can determine the MML names for select provisioned component types using the **prov-rtrv:all** MML command.
- *MML_name*—MML name for the desired component. You can determine the MML names for select components using the **prov-rtrv:all** MML command.

For example, to view the provisioning data for a point code that is called opc, enter the **prov-rtrv:opc:name="opc"** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2000-08-25 16:28:56
M  RTRV
   ""session=active:ptcode"
   /*
   NAME = opc
   DESC = Originating Point Code
   NETADDR = 201.1.100
   NETIND = 2
   */
```

The response to the command depends upon the component type that is associated with the desired component.

For example, to view the properties for an SS7 signaling service that is called ss7svc1, you would enter the **prov-rtrv:sigsvcprop:name="ss7svc1"** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-01 10:09:47
M  RTRV
   "session=active:sigsvcprop"
   /*
adjDestinations = 16
AlarmCarrier = 0
BOrigStartIndex = 0
BothwayWorking = 1
BTermStartIndex = 0
CctGrpCarrier = 2
CGBA2 = 0
CircHopCount = 0
CLIPEss = 0
CotInTone = 2010
CotOutTone = 2010
CotPercentage = 0
dialogRange = 0
ExtCOT = Loop
ForwardCLIinIAM = 1
ForwardSegmentedNEED = 1
GLARE = 0
GRA2 = 0
GRSEnabled = false
InternationalPrefix = 0
layerRetries = 2
layerTimer = 10
MaxACL = 3
maxMessageLength = 250
mtp3Queue = 1024
NationalPrefix = 0
NatureOfAddrHandling = 0
Normalization = 0
OMaxDigits = 24
OMinDigits = 0
OOverlap = 0
OwnClli = na
RedirMax = 3
ReleaseMode = Async
restartTimer = 10
RoutePref = 0
sendAfterRestart = 16
slsTimer = 300
srtTimer = 300
sstTimer = 300
standard = ANSI92
SwitchID = 0
TMaxDigits = 24
TMinDigits = 0
TOverlap = 0
variant = SS7-ANSI
VOIPPrefix = 0
   */
```

Retrieving Data for Select Components

You can retrieve data on selected components that are provisioned on your system. To retrieve data on selected components, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:all** command:

Note This command returns data on all signaling components, except for signaling service and linkset properties.

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 17:12:49
M  RTRV
   "session=active:all"
   /*
NAME                  COMPID    Parent Name           TID              Description
----                  --------  -----------           ---              -----------
"ether1"              00050003  "MGC-01"              CARD             "Ethernet Card 1"
"ether2"              00050004  "MGC-01"              CARD             "Ethernet Card 2"
"enif1"               00060003  "ether1"              ENETIF           "Ethernet IF 1"
"enif2"               00060004  "ether2"              ENETIF           "Ethernet IF 2"
"ls1"                 00080001  "dpc1"                LNKSET           "link set 1 to
2600-202-INET-6a"
"ls2"                 00080004  "dpc2"                LNKSET           "link set 2 to
2600-203-INET-6a"
"ls-itu"              00080005  "stp1"                LNKSET           "Lkset stp1,1-6-1"
"va-5300-202-1"       00100001  "va-5300-202"         IPLNK            "link 1 to
va-5300-202"
"va-5300-202-2"       00100002  "va-5300-202"         IPLNK            "link 2 to
va-5300-202"
"va-5300-203-1"       00100003  "va-5300-203"         IPLNK            "link 1 to
va-5300-203"
"va-5300-203-2"       00100004  "va-5300-203"         IPLNK            "link 2 to
va-5300-203"
"va-5800-5-1"         00100005  "va-5800-5"           IPLNK            "link 1 to
va-5300-202"
"va-5800-5-2"         00100006  "va-5800-5"           IPLNK            "link 2 to
va-5800-5"
"route1"              00110001  "MGC-01"              SS7ROUTE         "route to dpc1 via
ls1"
"rt3"                 00110005  "MGC-01"              SS7ROUTE         "SS7 Rte3-for scp2"
"rt1"                 00110006  "MGC-01"              SS7ROUTE         "SS7 Rte1-stp1"
"rt2"                 00110007  "MGC-01"              SS7ROUTE         "SS7 Rte2-for scp1"
"route2"              0011000a  "MGC-01"              SS7ROUTE         "route to dpc2 via
ls2"
"opc2"                00130002  "MGC-01"              PTCODE           "Own Pointcode"
"dpc2"                00130004  "MGC-01"              PTCODE           "TDM Switch dpc2
Pointcode"
"opc1"                00130006  "MGC-01"              PTCODE           "Own Pointcode"
"dpc1"                00130007  "MGC-01"              PTCODE           "TDM Switch dpc1
Pointcode"
"va-5300-202"         00140001  "nas1"                NASPATH          "Serviceto nas1"
"va-5300-203"         00140002  "nas2"                NASPATH          "Serviceto nas2"
"va-5800-5"           00140003  "nas1"                NASPATH          "Serviceto nas1"
"ss7svc2"             00150002  "dpc2"                SS7PATH          "SS7 service to
dpc2"
"ss7svc1"             00150005  "dpc1"                SS7PATH          "SS7 service to
dpc1"
"nas1"                00160001  "MGC-01"              EXTNODE          "va-5300-202"
"nas2"                00160002  "MGC-01"              EXTNODE          "va-5300-203"
"nas8"                00160003  "MGC-01"              EXTNODE          "va-5800-5"
```

```
"ls1link1"            001d0001  "ls1"               C7IPLNK          "link 1 of ls1 to
va-2600-202"
"ls2link1"            001d0002  "ls2"               C7IPLNK          "link 1 of ls2 to
va-2600-202"
"ls1link2"            001d0003  "ls1"               C7IPLNK          "link 2 of ls1 to
va-2600-203"
"ls2link2"            001d0004  "ls2"               C7IPLNK          "link 2 of ls2 to
va-2600-203"
"lk-3"                001d0005  "ls-itu"           C7IPLNK          "SS7ITU 2600-91"
"stp1"                001e0001  "MGC-01"           APC              "STP 1"
"scp1"                001e0002  "MGC-01"           APC              "SCP1 for PC/SSN"
"scp2"                001e0003  "MGC-01"           APC              "SCP2 for PC/SSN"
"ss7subsys3"          001f0003  "MGC-01"           SS7SUBSYS        "pc_ssn scp2
rte-ssn 254"
"ss7subsys1"          001f0004  "MGC-01"           SS7SUBSYS        "ssn 254(800)"
"ss7subsys2"          001f0005  "MGC-01"           SS7SUBSYS        "pc_ssn s
cp1 rte-ssn 254"
   */
```

Retrieving Data for All Components of a Particular Type

You can retrieve provisioning data on all components of a particular type on your system. To retrieve data on all components of a type, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:*component*:"all"** command:

Where:

component is the MML component type that is associated with the desired provisioned component group. You can find a complete list of MML component types in *Cisco PGW 2200 Softswitch Release 9 MML Command Reference*.

Note You cannot use the **prov-rtrv** command to retrieve signaling or routing properties (that is *sigsvcprop*, *lnksetprop*, and *trnkgrpprop*). You can list the properties for only one signaling or routing component per command instance. Please use the following format:

prov-rtrv:*propComp*:**name="***compName*" | **name="*ss7famName*"**

Where:

propComp—MML component name that corresponds to the property type that you want to retrieve, as presented in the following list:

sigsvcprop—Provides maintenance access to the properties of signaling services.
trnkgrpprop—Provides maintenance access to the properties of trunk groups
lnksetprop—Provides maintenance access to the properties of linksets.

compName—MML name of a previously provisioned signaling service or trunk group.
ss7famName—MML name of the SS7 family that is associated with the desired linkset.

For example, to view the provisioning data for all DPCs, enter the **prov-rtrv:dpc:"all"** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 17:16:42
M  RTRV
   "session=active:dpc"
   /*
NAME                  NETADDR      NETIND
----                  -------      ------
dpc2                  2.2.2        2
dpc1                  1.1.1        2
   */
```

Retrieving Data on the Current Provisioning Session

You can retrieve provisioning data on the current provisioning session. To retrieve provisioning data on the current session, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:session** command:

The system returns a response like the following:

```
MGC-02 - Media Gateway Controller 2001-06-13 13:39:19
M  RTRV
   "session=jtest:session"
   /*
Session ID = mml1
SRCVER = active
DSTVER = jtest
   */
```

Retrieving Data on Supported Signaling Protocols

You can retrieve protocol data for the current provisioning session. To retrieve protocol data, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:variants** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-12 17:18:25
M  RTRV
   "session=active:variants"
   /*
MDO File name         Protocol Family        Switch Type
-------------         ---------------        -----------
ANSISS7_CLEAR         SS7-ANSI               20
ANSISS7_MCI           SS7-ANSI               0
ANSISS7_NOATPTX       SS7-ANSI               0
ANSISS7_SPRINT        SS7-ANSI               0
ANSISS7_STANDARD      SS7-ANSI               0
ATT_41459             ISDNPRI                17
ATT_41459_C2          ISDNPRI                17
BELL_1268             ISDNPRI                22
BELL_1268_C3          ISDNPRI                22
BTNUP_BTNR167         SS7-UK                 5
BTNUP_IUP             SS7-UK                 5
BTNUP_NRC             SS7-UK                 5
DPNSS_BTNR188         DPNSS                  26
EISUP                 EISUP                  0
ETS_300_102           ISDNPRI                27
ETS_300_102_C1        ISDNPRI                27
ETS_300_102_C6        ISDNPRI                27
ETS_300_121           SS7-ITU                0
ETS_300_172           ISDNPRI                29
```

```
ETS_300_356           SS7-ITU              0
HKTA_2202             SS7-ITU              0
ISUPV1_POLI           SS7-ITU              0
ISUPV2_32DIG          SS7-ITU              0
ISUPV2_CZECH          SS7-ITU              0
ISUPV2_FINNISH96      SS7-ITU              0
ISUPV2_FRENCH         SS7-ITU              0
ISUPV2_GERMAN         SS7-ITU              0
ISUPV2_JAPAN          SS7-Japan            10
ISUPV2_KPNPB          SS7-ITU              0
ISUPV2_NTT            SS7-Japan            0
ISUPV2_SPANISH        SS7-ITU              0
ISUPV2_SWISS          SS7-ITU              0
ISUPV2_TELEFONICA     SS7-ITU              0
ISUPV2_VIETNAM        SS7-ITU              0
ISUPV3_UK             SS7-UK               0
ISUPV3_UK_AXE10       SS7-UK               15
ISUPV3_UK_AXE10_BTNETCHAT  SS7-UK               15
ISUPV3_UK_BTNETCHAT   SS7-UK               0
Q721_BASE             SS7-ITU              5
Q721_BRAZILIAN        SS7-ITU              5
Q721_CHINA            SS7-China            5
Q721_FRENCH           SS7-ITU              5
Q721_PHILLIPINE       SS7-ITU              5
Q761_ARGENTINA        SS7-ITU              0
Q761_ARGENTINA_C2     SS7-ITU              0
Q761_AUSTRL           SS7-ITU              0
Q761_AUSTRL_C2        SS7-ITU              0
Q761_BASE             SS7-ITU              0
Q761_BELG_BCOM        SS7-ITU              0
Q761_BELG_ISUP_CUJO   SS7-ITU              0
Q761_BELG_MOBI        SS7-ITU              0
Q761_CHILE            SS7-ITU              0
Q761_CHINA            SS7-China            0
Q761_CHINA_MOB        SS7-China            0
Q761_CHINA_MOB        SS7-ITU              0
Q761_DANISH           SS7-ITU              0
Q761_INDIA            SS7-ITU              0
Q761_KOREAN           SS7-ITU              0
Q761_NEWZEALAND       SS7-ITU              0
Q761_PERU             SS7-ITU              0
Q761_PORTUGAL         SS7-ITU              0
Q761_SIEMENS_MOBI     SS7-ITU              0
Q761_SINGAPORE        SS7-ITU              0
Q761_TAIWAN           SS7-ITU              0
Q761_THAILAND         SS7-ITU              0
Q767_BASE             SS7-ITU              0
Q767_BRAZIL           SS7-ITU              0
Q767_COLOMBIA         SS7-ITU              0
Q767_GUATEMALA        SS7-ITU              0
Q767_INDONESIA        SS7-ITU              0
Q767_ITAL             SS7-ITU              0
Q767_ITAL_INTERCONNECT  SS7-ITU              0
Q767_MEXICAN          SS7-ITU              0
Q767_RUSS             SS7-ITU              0
Q767_SPAN             SS7-ITU              0
Q767_SWED             SS7-ITU              0
Q767_TELSTRA          SS7-ITU              0
Q767_TURKISH          SS7-ITU              0
T113_BELL             SS7-ANSI             0
dummy                 AVM                  0
dummy                 MGCP                 0
dummy                 TCAPOverIP           0
dummy                 VSI                  0
```

```
*/
```

Provisioning a Dial Plan

You can provision dial plans on the Cisco PGW 2200 Softswitch by using the following commands. For more information on provisioning and maintaining dial plans, see *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

- **numan-add**—Adds an element to a dial plan.
- **numan-dlt**—Deletes an element from a dial plan.
- **numan-ed**—Edits an existing element in a dial plan.
- **numan-rtrv**—Displays information pertaining to an element or all elements in a dial plan.

Note You can verify dial plans using the translation verification viewer on the Cisco MGC toolbar. For information on using the translation verification viewer, see the "Verifying a Dial Plan Translation" section on page 3-135.

Importing Provisioning Data

You can import provisioning data files (created using the **prov-exp** MML command) and execute the MML commands that are contained in those files in batch mode to copy the setup from another system, or return a system to a baseline configuration. See the "Exporting Provisioning Data" section on page 3-76 for more information on exporting provisioning data.

To import the provisioning data files and execute the MML commands in batch mode, log in to the active Cisco PGW 2200 Softswitch, and enter the following UNIX command:

```
mml -b export_directory_path/filename
```

Where:

- *export_directory_path*—Directory path to the location of the exported provisioning data files.
- *filename*—Name of the provisioning data file you want to import.

The provisioning data files must be provisioned in the following order:

1. config.mml—Contains core configuration data (signaling services, SS7 nodes)
2. export_trunks.dat—Created only when trunks are configured on your system
3. export_trkgrp.dat—Created only when trunk groups are configured on your system)
4. routing.mml—Contains routing plans
5. *custGrpID*.mml—One of these files is created for each existing dial plan. The file is named with the associated customer group ID number.

For example, to import the provisioning data that is stored in the config.mml file, which is located in the /opt/ CiscoMGC/etc/cust_specific/saved_config directory, enter the following command:

```
mml -b /opt/CiscoMGC/etc/cust_specific/saved_config/config.mml
```

Exporting Provisioning Data

You can use the **prov-exp** MML command to export the currently provisioned setup of the Cisco PGW 2200 Softswitch in MML-command form to a file or files. This export enables you to copy the provisioning data from one Cisco PGW 2200 Softswitch and set up another Cisco PGW 2200 Softswitch with that same provisioning data or to restore a Cisco PGW 2200 Softswitch to a baseline provisioning environment. See the "Importing Provisioning Data" section on page 3-75 for information on importing the provisioning data that the **prov-exp** MML command created.

To export part of the current configuration of the Cisco PGW 2200 Softswitch to a file, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-exp:*tid*:dirname="*export_directory_name*"** command:

Where:

- *tid*—Types of data. The following list presents the data types:
  - config—Core configuration data (signaling services, SS7 nodes), including trunks and trunk groups. This selection creates the following files: config.mml, export_trunks.dat (created only when trunks are configured on your system), and export_trkgrp.dat (created only when trunk groups are configured on your system).
  - routing—Routing plans. This selection creates a file called routing.mml
  - numan—Dial plans. This selection creates a file for each dial plan that is specified on your system. The filename depends on the customer group ID for each dial plan; that is, the filename conforms to the format *custGrpID*.mml.
  - trkgrp—Trunk group data only.
  - trunk—Trunk data only.
  - all—Entire configuration (all data).
- *export_directory_name*—Name of the directory to which the data is exported. This directory is a subdirectory within the /opt/CiscoMGC/etc/cust_specific directory that is established at installation.

For example, to export the core configuration data to a file stored in the /opt/CiscoMGC/etc/cust_specific/saved_config directory, enter the **prov-exp:config:dirname="saved_config"** command:

To export all of the current configuration of the Cisco PGW 2200 Softswitch to several files, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-exp:all:dirname="*eport_directory_name*"** command:

Where:

export_directory_name is the name of the directory to which the data is exported. This directory is a subdirectory within the /opt/CiscoMGC/etc/cust_specific directory that is established at installation.

When you enter the **prov-exp** command, the system creates the following files in the specified directory:

- config.mml—Contains core configuration data (signaling services, SS7 nodes)
- export_trunks.dat—Created only when trunks are configured on your system)
- export_trkgrp.dat—Created only when trunk groups are configured on your system)
- routing.mml—Contains routing plans
- *custGrpID*.mml—One of these files is created for each existing dial plan. The filename includes the associated customer group ID number.
- GLBL.awhite—Contains global screening data for A-number white lists. Introduced in Release 9.4(1).

- GLBL.ablack—Contains global screening data for A-number black lists. Introduced in Release 9.4(1).
- GLBLbwhite—Contains global screening data for B-number white lists. Introduced in Release 9.4(1).
- GLBLbblack—Contains global screening data for B-number black lists. Introduced in Release 9.4(1).

For example, to export all of the provisioning data into files that are stored in the /opt/CiscoMGC/etc/cust_specific saved_config directory, enter the **prov-exp:all:dirname="saved_config"** command:

Managing Automatic Congestion Control

The Cisco PGW 2200 Softswitch supports Automatic Congestion Control (ACC). ACC dynamically regulates incoming traffic on the Cisco PGW 2200 Softswitch to levels that can be processed effectively. The regulation requires rejecting a percentage of new calls when the Cisco PGW 2200 Softswitch is congested. ACC increases the throughput of completed calls through the telephone network during periods of overload.

ACC provides three major functions:

- Rejection of calls to prevent internal congestion—When the Cisco PGW 2200 Softswitch is congested, it rejects a user-defined percentage of calls (depending on internal overload level) and sends an ISUP release message to the adjacent signaling point. That ISUP release message has a clear cause of Switch Equipment Congestion and contains an Automatic Congestion Level (ACL) value that indicates the overload level of the Cisco PGW 2200 Softswitch. For a call that is in progress when overload occurs and the call clears normally, the ISUP release message has a clear cause of Normal Call Clearing and an ACL value that is associated with the current overload level of the Cisco PGW 2200 Softswitch.
- Reception and response to congested status—When an adjacent signaling point is congested, the Cisco PGW 2200 Softswitch can reduce the amount of traffic that is offered by rerouting calls or by rejecting a percentage of the calls. This response to congestion is referred to as outgoing load control (OLC).
- Detection and transmission of congested status—The Cisco PGW 2200 Softswitch can indicate its current level of congestion to adjacent signaling points using SS7 ISUP. Detection of congestion is based on dynamic measurements such as CPU occupancy, size of queues and buffers, or amounts of other resources that are needed for call processing. This detection of congestion is referred to as incoming load control (ILC).

ACC is described in the following sections:

- Managing Call Rejection Percentages, page 3-77
- Managing Outgoing Load Control, page 3-80
- Managing Incoming Load Control, page 3-91

Managing Call Rejection Percentages

ACC enables the Cisco PGW 2200 Softswitch to manage its internal congestion level by rejecting calls. When call volume causes the Cisco PGW 2200 Softswitch to reach one of its machine congestion levels (MCLs), the system can send ACL indications to the adjacent signaling points and release a percentage of calls that you define.

The valid values for MCL are shown in Table 3-14.

Table 3-14 Machine Congestion Level Values

Machine Congestion Level	Description
MCO	No congestion present.
MC1	Mild congestion.
MC2	Moderate congestion.
MC3	Severe congestion.

The following sections provide the procedures for managing call rejection percentages:

- Modifying the MCL Call Reject Settings, page 3-79
- Retrieving the MCL Call Reject Settings, page 3-79

The Cisco PGW 2200 Softswitch raises alarms that are associated with three of the MCLs. The Cisco PGW 2200 Softswitch raises an alarm as it detects an MCL. These alarms are automatically cleared when the Cisco PGW 2200 Softswitch exits an MCL. Table 3-15 shows the alarm that corresponds to each which MCL. For more information on these alarms, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

Table 3-15 Alarm Associations for MCLs

Machine Congestion Level	Associated Alarm
MC1	OverloadLight
MC2	OverloadMedium
MC3	OverloadHeavy

For example, as the Cisco PGW 2200 Softswitch detects a transition in congestion from MC1 to MC2 and back, the raising and clearing of alarms progresses as follows:

1. The OverloadLight alarm is set.
2. The OverloadLight alarm is cleared.
3. The OverloadMedium alarm is set.
4. The OverloadMedium alarm is cleared.
5. The OverloadLight alarm is set.

Note The alarms that correspond to Cisco PGW 2200 Softswitch MCLs create SNMP traps. To identify these alarms among the SNMP traps, look for the tpAlarmCatName object to contain the name of the alarm (OverloadLight, OverloadMedium, or OverloadHeavy) and the tpAlarmSet object to indicate whether the alarm is being set (2) or cleared (1). For more information on the MIBs for the Cisco PGW 2200 Softswitch, see *Cisco PGW 2200 Softswitch Release 9 Management Information Base Guide*.

Modifying the MCL Call Reject Settings

To modify the percentage of calls that are rejected for a particular MCL, perform the following steps:

Note You can use the Cisco Voice Services Provisioning Tool (VSPT) to modify the MCL call release settings. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify the percentage of calls that are released for a particular MCL:

```
prov-ed:mclcallreject:name="mcl_name",callreject=value
```

Where:

- *mcl_name*—Name of the MCL level for which you want to modify the call release percentage. The following names are valid:
  - mcl1—Specifies the percentage of calls that is defined by *value.* Calls are released when the Cisco PGW 2200 Softswitch enters MCL1. The default value is 25.
  - mcl2—Specifies the percentage of calls that is defined by *value.* Calls are released when the Cisco PGW 2200 Softswitch enters MCL2. The default value is 50.
  - mcl3—Specifies the percentage of calls that is defined by *value,* Calls are released when the Cisco PGW 2200 Softswitch enters MCL3. The default value is 100.
- *value*—Percentage of calls that are released. The valid range is 0 through 100.

For example, to modify the percentage of **MCL1** so that **30** percent of calls are released when the Cisco PGW 2200 Softswitch detects MCL1, enter the **prov-ed:mclcallreject:name="mcl1", callreject=30** command:

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Retrieving the MCL Call Reject Settings

You can retrieve the settings for one or all of the MCLs on your Cisco PGW 2200 Softswitch. To retrieve the settings for a single MCL, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:mclcallreject:name="*mcl_name*"** command:

Where:

mcl_name—Name of the MCL setting. The following names are valid:

- mcl1
- mcl2
- mcl3

The system responds with a listing of the call release settings for the MCL.

For example, to retrieve the settings for an MCL called **mcl1**, enter the **prov-rtrv:mclcallreject:name="mcl1"** command:

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2001-02-23 14:13:40
M  RTRV
   "session=accstuff:mclcallreject"
   /* MCLNAME = mcl1
CALLREJECT = 25
   */
```

To retrieve the settings for every MCL on your system, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:mclcallreject:"all"** command.

The system responds with a listing of the call release settings for each MCL.

```
MGC-01 - Media Gateway Controller 2001-02-23 14:15:02
M  RTRV
   "session=accstuff:mclcallreject"
   /*
Name                 CallReject
-------------------- ----------
mcl1                 25
mcl2                 50
mcl3                 100
   */
```

Managing Outgoing Load Control

Outgoing load control (OLC) regulates outgoing traffic to reduce congestion on other signaling points that provide an ACL indication to the Cisco PGW 2200 Softswitch. Traffic might be rerouted or released instead of being sent to congested signaling points.

There are two types of outgoing load congestion controls:

- Cancel-to (CANT)—Because of congestion, causes the rejection of a percentage of the traffic that would have been routed to an SS7 signaling path (systems that are configured for signaling) or to a trunk group (systems that are configured for call control).

Note A Cisco PGW 2200 Softswitch configured for signaling was formerly called the Cisco SC2200 Signaling Controller. A Cisco PGW 2200 Softswitch configured for call control was formerly called the Cisco VSC3000 Virtual Switch Controller. Some documentation for your telephony solution might use these names.

- Skip—Causes a percentage of the traffic that is routed to a trunk group to overflow to alternate routes. If an alternate route is not available, calls are rejected because of congestion.

Note Skip controls are available only on trunk groups (systems that are configured for call control).

When applying congestion controls, the CANT control is given precedence over the skip control. Percentages that are assigned to CANT and skip for each ACL are independent. If both skip and CANT percentages are specified for a trunk group, these percentages are applied independently, based on the number of calls that are offered to a trunk group. The results are given in Table 3-16.

Table 3-16 CANT and Skip Results Matrix

CANT	Skip	Result
Yes	Yes	CANT
No	Yes	Skip
No	No	None
Yes	No	CANT

CANT and skip percentages can be different depending on the type of traffic.

- Direct routed—This trunk group is the first choice in a list of routes in a priority sequence coming from the adjacent signaling point.
- Alternate routed—This trunk group is an alternate route in a list of routes in priority sequence coming from the adjacent signaling point.

Note The alternate routed control is available only on trunk groups (call control configurations).

The outgoing load congestion controls are configured in sets that are referred to as ACC response categories (ACCRCs). The ACCRCs attach a label to a set of configuration data for each control that can be reused. You can configure only one ACCRC per SS7 signaling path (signaling configurations) or trunk group (call control configurations) that supports outgoing traffic. If you do not assign an ACCRC to an SS7 signaling path or trunk group, the system performs the default ACC response procedures.

There is an ACCRC field for each control type combination of every ACL indication level. For example, there are three alternate routed skip control fields for ACL 1, 2, and 3: acl1arskip, acl2arskip, and acl3arskip). The Cisco PGW 2200 Softswitch comes configured with a default ACCRC, which cannot be modified. The following list presents the field values for the default ACCRC:

- acl1drcant—50
- acl1drskip—20
- acl1arcant—50
- acl1arskip—20
- acl2drcant—90
- acl2drskip—20
- acl2arcant—90
- acl2arskip—20
- acl3drcant—100
- acl3drskip—0
- acl3arcant—100
- acl3arskip—0

When an adjacent signaling point sends an ACL indication, the Cisco PGW 2200 Softswitch enables the actions that are defined in the ACCRC for a duration that is defined by the configurable ACL timer ACLDur.

The following sections describe how to manage OCL:

- Adding an ACC Response Category on a System Configured for Signaling, page 3-82

- Adding an ACC Response Category on a System Configured for Call Control, page 3-83
- Modifying an ACC Response Category on a System Configured for Signaling, page 3-85
- Modifying an ACC Response Category on a System Configured for Call Control, page 3-85
- Deleting an ACC Response Category on a System Configured for Signaling, page 3-87
- Deleting an ACC Response Category on a System Configured for Call Control, page 3-87
- Retrieving ACC Response Category Settings, page 3-88
- Modifying the SS7 Signaling Path Associated with an ACC Response Category, page 3-89
- Modifying the Trunk Group Associated with an ACC Response Category, page 3-89
- Modifying an ACL Timer, page 3-90

Adding an ACC Response Category on a System Configured for Signaling

To add an ACCRC on your system when it is configured for signaling, perform the following steps:

Note You can use the Cisco VSPT to add an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to configure the values for an ACCRC:

```
prov-add:accrespcat:name="cat_name"[,field_name=value,field_name=value...]
```

Where:

- *cat_name*—MML name for the ACCRC.
- *field_name*—ACCRC field that specifies a percentage of calls that are released when a congestion indication of a particular ACL level is received from an adjacent signaling point. The following fields can be configured:
  - acl1drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 1.
  - acl2drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 2.
  - acl3drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 3.
- *value*—Percentage of calls that are released. The valid range is 0 through 100.

Note Any ACCRC field for which you do not enter a value is set to 0.

For example, to configure an ACCRC called **cat1** so that **20** percent of calls are rejected when an ACL of 1 is received, **50** percent of calls are rejected when an ACL of 2 is received, and **98** percent of calls are rejected when an ACL of 3 is received, you would enter the following command:

```
prov-add:accrespact:name="cat1",acl1drcant=20,acl2drcant=50,acl3drcant=98
```

Step 3 Enter the following command to associate an ACCRC with an SS7 signaling path:

```
prov-ed:sigsvcprop:name="comp_name",ACCRespCatName="cat_name"
```

Where:

- *comp_name*—MML name for the SS7 signaling path to be associated with an ACCRC.

Note If you do not know the MML name of the SS7 signaling path, use the **prov-rtrv:ss7path:"all"** command to find the name.

- *cat_name*—MML name for the ACCRC.

For example, to associate an ACCRC called **cat1** with an SS7 signaling path named **access1**, enter the following command:

```
prov-ed:sigsvcprop:name="access1",ACCRespCatName="cat1"
```

Step 4 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Adding an ACC Response Category on a System Configured for Call Control

To add an ACCRC on your system when it is configured for call control, perform the following steps:

Note You can also use the Cisco VSPT to add an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool Users Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to configure the values for an ACCRC:

```
prov-add:accrespcat:name="cat_name"[,field_name=value,field_name=value...]
```

Where:

- *cat_name*—MML name for the ACCRC.
- *field_name*—ACCRC field that specifies a percentage of calls that are released when an adjacent signaling point sends a congestion indication of a particular ACL level. The following fields can be configured:
  - acl1drcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 1 and this trunk group is configured as a direct route from that signaling point.
  - acl1drskip—Specifies the percentage of calls that is defined in *value.* Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 1.
  - acl1arcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 1 and this trunk group is configured as an alternate route from that signaling point.
  - acl1arskip—Specifies the percentage of calls that is defined in *value.* Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 1.
  - acl2drcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 2 and this trunk group is configured as a direct route from that signaling point.

  - acl2drskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 2.
  - acl2arcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 2 and this trunk group is configured as an alternate route from that signaling point.
  - acl2arskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 2.
  - acl3drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 3 and this trunk group is configured as a direct route from that signaling point.
  - acl3drskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 3.
  - acl3arcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 3 and this trunk group is configured as an alternate route from that signaling point.
  - acl3arskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 3.
- *value*—Percentage of calls that is released. The valid range is 0 through 100.

Note Any ACCRC field for which you do not enter a value is set to 0.

For example, to configure an ACCRC on a trunk group that is called **cat1** so that when an ACL indication of 1 is received, **20** percent of direct routed calls are rejected, **20** percent of direct routed calls are rerouted, **10** percent of alternate routed calls are rejected, and **10** percent of alternate routed calls are rerouted, enter the following command:

```
prov-add:accrespact:name="cat1",acl1drcant=20,acl1drskip=20,acl1arcant=10,acl1arskip=10
```

Step 3 Enter the following command to associate an ACCRC with a trunk group:

```
prov-ed:trnkgrpprop:name="comp_name",ACCRespCatName="cat_name"
```

Where:

- *comp_name*—MML name for the trunk group for which you want to configure an ACCRC.

  Note If you do not know the MML name of the trunk group, use the **prov-rtrv:trnkgrp:"all"** command to find the name.

- *cat_name*—MML name for the ACCRC you want to configure.

For example, to create an ACCRC called **cat1** on a trunk group named **trunk**, enter the following command:

```
prov-ed:trnkgrpprop:name="trunk1",ACCRespCatName="cat1"
```

Step 4 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Modifying an ACC Response Category on a System Configured for Signaling

To modify an ACCRC on a system that is configured for signaling, perform the following steps:

Note You can use the Cisco VSPT to modify an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool Users Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify the configuration of an ACCRC:

```
prov-ed:accrespcat:name="cat_name"[,field_name=value,field_name=value...]
```

Where:

- *cat_name*—MML name for the ACCRC.
- *field_name*—ACCRC field that specifies a percentage of calls that is released when an adjacent signaling point sends a congestion indication of a particular ACL level. You can modify the following fields:
  - acl1drcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 1.
  - acl2drcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 2.
  - acl3drcant—Specifies the percentage of calls that is defined in *value.* Calls are released when an adjacent signaling point sends an ACL indication of 3.
- *value*—Percentage of calls that is released. The valid range is 0 through 100.

For example, to modify the configuration of an ACCRC called **cat1** so that **30** percent of calls are rejected when an ACL of 1 is received, enter the following command:

```
prov-ed:accrespact:name="cat1",acl1drcant=30
```

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Modifying an ACC Response Category on a System Configured for Call Control

To modify an ACCRC on your system when it is configured for call control, perform the following steps:

Note You can also use the Cisco VSPT to modify an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool Users Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify the configuration for an ACCRC:

```
prov-ed:accrespcat:name="cat_name"[,field_name=value,field_name=value...]
```

Where:

- *cat_name*—MML name for the ACCRC.

- *field_name*—ACCRC field that specifies a percentage of calls that is released when an adjacent signaling point sends a congestion indication of a particular ACL level. You can modify the following fields:
  - acl1drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 1 and this trunk group is configured as a direct route from that signaling point.
  - acl1drskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 1.
  - acl1arcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 1 and this trunk group is configured as an alternate route from that signaling point.
  - acl1arskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 1.
  - acl2drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 2 and this trunk group is configured as a direct route from that signaling point.
  - acl2drskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 2.
  - acl2arcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 2 and this trunk group is configured as an alternate route from that signaling point.
  - acl2arskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 2.
  - acl3drcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 3 and this trunk group is configured as a direct route from that signaling point.
  - acl3drskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 3.
  - acl3arcant—Specifies the percentage of calls that is defined in *value*. Calls are released when an adjacent signaling point sends an ACL indication of 3 and this trunk group is configured as an alternate route from that signaling point.
  - acl3arskip—Specifies the percentage of calls that is defined in *value*. Calls are rerouted to an alternate trunk group when an adjacent signaling point sends an ACL indication of 3.
- *value*—Percentage of calls that is released. The valid range is 0 through 100.

For example, to modify the configuration an ACCRC on a trunk group that is called **cat1** so that **30** percent of calls are rejected when an ACL of 1 is received, enter the following command:

```
prov-ed:accrespact:name="cat1",acl1drcant=30,acl1arcant=30
```

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Deleting an ACC Response Category on a System Configured for Signaling

To delete an ACCRC on your system when it is configured for signaling, perform the following steps:

Note You can also use the Cisco VSPT to delete an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool Users Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Before you can delete an ACCRC, you must delete the associated SS7 signaling path. To delete the signaling path, enter the **prov-dlt:ss7path:name="*comp_name*"** command:

Where:

comp_name—MML name for the SS7 signaling path to delete.

Note If you do not know the MML name of the SS7 signaling path, use the **prov-rtrv:ss7path:"all"** command to find the name.

For example, to delete an SS7 signaling path named **access1**, enter the **prov-dlt:ss7path:name="access1"** command:

Step 3 Enter the **prov-dlt:accrespcat:name="cat_name"** command to delete an ACCRC:

Where:

cat_name—Name of the ACCRC to delete.

For example, to delete an ACCRC called **cat1**, enter the **prov-dlt:accrespact:name= "cat1"** command:

Step 4 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Deleting an ACC Response Category on a System Configured for Call Control

To delete an ACCRC on a system when it is configured for call control, perform the following steps:

Note You can also use the Cisco VSPT to delete an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool Users Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Before you can delete an ACCRC, you must delete the associated trunk group. To delete the trunk group, enter the **prov-dlt:trnkgrp:name="*comp_name*"** command:

Where:

comp_name—MML name for the trunk group to delete.

Note If you do not know the MML name of the trunk group, use the **prov-rtrv:trnkgrp:"all"** command to find the name.

For example, to delete a trunk group named **access1**, enter the **prov-dlt:trnkgrp:name="access1"** command:

Step 3 Enter the following command to delete an ACCRC:

prov-dlt:accrespcat:name="*cat_name*"

Where:

cat_name—Name of the ACCRC to delete.

For example, to delete an ACCRC called **cat1**, enter the **prov-dlt:accrespact:name="cat1"** command:

Step 4 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Retrieving ACC Response Category Settings

You can retrieve the settings for one or all of the ACCRCs configured on the Cisco PGW 2200 Softswitch. To retrieve the settings for a single ACCRC, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:accrespact:name= "*cat_name*"** command:

Where:

cat_name—Name of the ACCRC for which you want settings.

The system lists the settings for each of the ACCRC fields.

For example, to retrieve the settings for an ACCRC called **cat1**, enter the **prov-rtrv:accrespact:name="cat1"** command:

The system responds with a message like the following:

```
MGC-01 - Media Gateway Controller 2001-02-23 12:23:20
M  RTRV
   "session=jimacc:accrespcat"
   /* NAME  = cat1
ACL1DRCANT = 20
ACL1DRSKIP = 10
ACL1ARCANT = 20
ACL1ARSKIP = 10
ACL2DRCANT = 50
ACL2DRSKIP = 20
ACL2ARCANT = 50
ACL2ARSKIP = 20
ACL3DRCANT = 98
ACL3DRSKIP = 2
ACL3ARCANT = 98
ACL3ARSKIP = 2
   */
```

To retrieve the settings for every ACCRC on the system, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:accrespact:"all"** command:

The system responds with a message like the following.

```
MGC-01 - Media Gateway Controller 2001-02-23 11:15:32
M  RTRV
   "session=migrated:accrespcat"
   /*
Name                 Acl1DrCant Acl1DrSkip Acl1ArCant Acl1ArSkip Acl2DrCant Acl2DrSkip
Acl2ArCant Acl2ArSkip Acl3DrCant Acl3DrSkip Acl3ArCant Acl3ArSkip
-------------------- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
cat1                 20   10   20   10   50   20   50   20   98   2    98   2
default              50   20   50   20   90   20   90   20   100  0    100  0
   */
```

Modifying the SS7 Signaling Path Associated with an ACC Response Category

To modify the SS7 signaling path that is associated with an ACCRC on your system when it configured for signaling, perform the following steps:

Note You can use the Cisco VSPT to modify the SS7 signaling path that is associated with an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify an SS7 signaling path that is associated with an ACCRC:

prov-ed:sigsvcprop:name="*comp_name*",ACCRespCatName="*cat_name*"

Where:

- *comp_name*—MML name for the SS7 signaling path to be associated with an ACCRC.

  Note If you do not know the MML name of the SS7 signaling path, use the **prov-rtrv:ss7path:"all"** command to find the name.

- *cat_name*—MML name for the ACCRC.

For example, to associate an ACCRC called **cat1** with an SS7 signaling path named **access2**, enter the **prov-ed:sigsvcprop:name= "acces2",ACCRespCatName="cat1"** command:

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Modifying the Trunk Group Associated with an ACC Response Category

To modify the trunk group that is associated with an ACCRC on your system when it is configured for call control, perform the following steps:

Note You can use the Cisco VSPT to modify the trunk group that is associated with an ACCRC. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify the trunk group that is associated with an ACCRC:

```
prov-ed:trnkgrpprop:name="comp_name",ACCRespCatName="cat_name"
```

Where:

- *comp_name*—MML name for the trunk group to be associated with an ACCRC.

  Note If you do not know the MML name of the trunk group, use the **prov-rtrv:trnkgrp:"all"** command to find the name.

- *cat_name*—MML name for the ACCRC.

For example, to associate an ACCRC called **cat1** with a trunk group named **trunk2**, enter the **prov-ed:trnkgrpprop:name="trunk2",ACCRespCatName="cat1"** command:

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Modifying an ACL Timer

When the Cisco PGW 2200 Softswitch receives ACL indication from an adjacent signaling point, it activates the controls that are specified for that congestion level on the trunk group or SS7 signaling path. The trunk group or SS7 signaling path is associated with the release message and starts an ACL timer (ACLDur). You can configure the duration of this timer on a trunk group or SS7 signaling path. The default value of the ACLDur timer is 5 seconds. When the ACL timer expires, the system deactivates the congestion controls on the trunk group or SS7 signaling path.

Note You might need to adjust timers depending on the size of your trunk group.

To modify the settings for the ACL timer that is associated with a particular trunk group or SS7 signaling path, perform the following steps:

Note You can also use the Cisco VSPT to modify the settings for an ACL timer. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify the property that sets the duration of the ACL timer:

```
prov-ed:component:name="comp_name",ACLDur=num
```

Where:

- *component*—MML component type name for the SS7 signaling path or trunk group properties. Depending on the type of system, enter one of the following:
  - sigsvcprop—Component type for signaling path properties, used to set the ACL timer duration on systems that are configured for signaling.
  - trnkgrprop—Component type for trunk group properties, used to set the ACL timer duration on systems that are configured for call control.

- *comp_name*—MML name for the SS7 signaling path or trunk group for which you modify the duration of the ACL timer.
- *num*—Duration of the ACL timer, in seconds. The default is 5.

For example, to change the duration of the ACL timer to 20 seconds on a trunk group named **trunk1**, enter the following command:

```
prov-ed:trnkgrpprop:name="trunk1",ACLDur=20
```

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Managing Incoming Load Control

When the Cisco PGW 2200 Softswitch is overloaded and must reduce congestion, it uses Incoming load control (ILC) to regulate incoming traffic. When the Cisco PGW 2200 Softswitch enters and abates the different MCLs, it reroutes or rejects calls according to user-defined settings.

Because ITU-based signaling points use a three-level congestion standard, the Cisco PGW 2200 Softswitch supports a command that maps the MCL values to the ITU congestion standard. No modification is necessary for systems that use the ANSI congestion standard.

The following list presents the measurements of five threshold values that determine the MCLs:

- Call rate (callrate)—Measures the number of incoming call attempts per second.
- CPU utilization (cpu)—Measures the percentage of CPU utilization.
- Engine input queue length (queuelen)—Measures the number of messages waiting in the call engine input queue.
- Memory address utilization (memoryaddress)—Measures the percentage of physical memory address space that is in use.
- Virtual memory address utilization (virtualmemory)—Measures the percentage of virtual memory address space that is in use.

You can configure the onset and abatement settings for each of these threshold values. You can also configure the percentage of calls that is released once the thresholds are met. Table 3-17 lists the default values for the MCL thresholds.

Table 3-17 Default Values for the MCL Thresholds

Threshold	MCL1 Onset	MCL1 Abate	MCL2 Onset	MCL2 Abate	MCL3 Onset	MCL3 Abate
cpu	82	75	90	77	93	85
virtualmemory	80	75	85	80	90	80
memoryaddress	84	80	88	82	93	85
queuelen	75	60	80	70	85	75
callrate	0	0	0	0	0	0

The following sections describe ICL:

- Mapping Machine Congestion Level to the ANSI or ITU Congestion Standard, page 3-92
- Modifying MCL Threshold Values, page 3-93

- Retrieving MCL Threshold Values, page 3-94

Mapping Machine Congestion Level to the ANSI or ITU Congestion Standard

When the Cisco PGW 2200 Softswitch is overloaded, it sends an ACL value to adjacent signaling points in an ISUP release message that is based on the MCL. Because ANSI- and ITU-based signaling points have different maximum ACL values, the Cisco PGW 2200 Softswitch uses a property, MaxACL, associated with an SS7 signaling service or trunk group, to map the ACC maximum overload level value to the maximum ACL value used by the adjacent signaling point.

ANSI-based signaling points have a maximum ACL value of 3. ITU-based signaling points have a maximum ACL value of 2. The ACC maximum overload level value is 3. When MaxACL is set to 3, the maximum MCL value is mapped to the ANSI standard. (The default value for MaxACL is 3.) When MaxACL is set to 2, the maximum MCL value is mapped to the ITU standard. MaxACL also has a third possible setting, 0, which disables the sending of ACL indications in the ISUP release message. Table 3-18 shows how the MaxACL settings map the MCL values to the ANSI and ITU congestion standards.

Note Disabling the MaxACL parameter (setting it to 0) does not disable the ACC functionality. If the MaxACL parameter is set to 0 and the Cisco PGW 2200 Softswitch becomes congested, the percentage of calls that is specified for that overload level is released. In this case, the associated ISUP release message does not contain an ACL indication. The ISUP release message still indicates the proper clear cause.

Note You can use the Cisco VSPT to map the MCL to the congestion standard used by the adjacent signaling points. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

To map the MCL to the appropriate congestion standard for the associated signaling point, perform the following steps:

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to set the property that maps the MCL to the congestion standard used by the adjacent signaling point:

```
prov-ed:component:name="comp_name",MaxACL=num
```

Where:

- *component*—MML component type name for the SS7 signaling path or trunk group properties. Depending on the type of system, enter one of the following:
  - sigsvcprop—Component type for signaling path properties, used to map MCL for systems that are configured for signaling.
  - trnkgrprop—Component type for trunk group properties, used to map MCL for systems that are configured for call control.
- *comp_name*—MML name for the SS7 signaling path or trunk group for which you map the MCL to the congestion standard used by the adjacent signaling point.
- *num*—Number that indicates how to map the MCL values. Table 3-18 lists the valid values for this parameter and their associated congestion levels.

Table 3-18 MCL Mapping Values

MaxACL Value	Congestion Standard	MCL Value	ACL Value in Release Message
0	N/A	MC0 through MC3	ACL is disabled
2	ITU	MC0 MC1 MC2 MC3	ACL is not present 1 2 2
3	ANSI	MC0 MC1 MC2 MC3	ACL is not present 1 2 3

For example, to map the MCL on a trunk group named **trunk1,** which is next to a signaling point that uses the ITU congestion standard, enter the **prov-ed:trnkgrpprop:name="trunk1",MaxACL=2** command:

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Modifying MCL Threshold Values

To modify existing MCL threshold values on the Cisco PGW 2200 Softswitch, perform the following steps:

Note You can also use the Cisco VSPT to make the provisioning changes necessary to modify existing MCL threshold values. For more information on using the Cisco VSPT, see *Cisco Voice Services Provisioning Tool User Guide*.

Step 1 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 2 Enter the following command to modify existing MCL threshold values:

```
prov-ed:mclthreshold:name="thres_type"[,field_name=value,field_name=value,...]
```

Where:

- *thresh_type*—MML name for the MCL threshold type for which you want to modify values. The following threshold types are valid.
  - callrate—Measures the number of incoming call attempts per second.
  - cpu—Measures the percentage of CPU utilization.
  - queuelen—Measures the number of processes waiting in the call engine input queue.
  - memoryaddress—Measures the percentage of how much physical memory address space is in use.
  - virtualmemory—Measures the percentage of how much virtual memory address space is in use.

- *field_name*—MCL threshold field that specifies the onset and abatement values for the selected threshold type. Configure the following fields:
  - mcl1onset—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch enters MCL1.
  - mcl1abate—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch abates MCL1.
  - mcl2onset—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch enters MCL2.
  - mcl2abate—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch abates MCL2.
  - mcl3onset—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch enters MCL3.
  - mcl3abate—Specifies the threshold, as defined in *value*, at which the Cisco PGW 2200 Softswitch abates MCL3.
- *value*—Specifies the threshold value for the specified field. The valid value for fields that are associated with the cpu, memoryaddress, and virtualmemory threshold types is a percentage, ranging from 0 to 100. The valid value for fields that are associated with the callrate and queuelen threshold types is any nonnegative integer.

Note Setting the thresholds for any of the fields to 0 disables the all of the MCL settings.

For example, to modify the MCL threshold values for the **cpu** threshold type, enter the following command to set the following values:

- MCL1 is reached when CPU utilization reaches **75** percent
- MCL1 abates when CPU utilization reaches **65** percent

```
prov-add:mclthreshold:name="cpu",mcl1onset=75,mcl1abate=65
```

Step 3 Save and activate your provisioning changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Retrieving MCL Threshold Values

You can retrieve the values for one or all of the MCL threshold types that are configured on your Cisco PGW 2200. To retrieve the settings for a single MCL threshold type, log in to the active Cisco PGW 2200, start an MML session, and enter the **prov-rtrv:mclthreshold:name="*thres_type*"** command:

Where:

thresh_type—MML name for the MCL threshold type. The following threshold types are valid:

- callrate—Measures the number of incoming call attempts per second.
- cpu—Measures the percentage of CPU utilization.
- queuelen—Measures the number of processes waiting in the call engine input queue.
- memoryaddress—Measures the percentage of physical memory address space that is in use.
- virtualmemory—Measures the percentage of virtual memory address space that is in use.

The system responds lists the values for each of the fields that are associated with the MCL threshold type.

For example, to retrieve the values for the **queuelen** MCL threshold type, enter the **prov-rtrv:mclthreshold:name="queuelen"** command:

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2001-02-23 14:09:42
M  RTRV
   "session=accstuff:mclthreshold"
   /* NAME  = queuelen
MCL1ONSET = 75
MCL1ABATE = 60
MCL2ONSET = 80
MCL2ABATE = 70
MCL3ONSET = 85
MCL3ABATE = 75
   */
   ;
```

To retrieve the values for every MCL threshold type on your system, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:mclthreshold:"all"** command:

The system responds lists the settings for each field for all of the ACCRCs.

```
MGC-01 - Media Gateway Controller 2001-02-23 14:11:11
M  RTRV
   "session=accstuff:mclthreshold"
   /*
Name           Mcl1Onset Mcl1Abate Mcl2Onset Mcl2Abate Mcl3Onset Mcl3Abate
-------------- --------- --------- --------- --------- --------- ---------
callrate       0         0         0         0         0         0
cpu            82        75        90        77        95        85
memoryaddress  84        80        88        82        93        85
queuelen       75        60        80        70        85        75
virtualmemory  80        75        85        80        90        80
   */
```

Managing a Cisco PGW 2200 Softswitch Platform

The following sections describe the operations that you can use to manage the Cisco PGW 2200 Softswitch platform:

- Performing a Manual Switchover, page 3-96
- Verifying Successful Completion of a Switchover, page 3-97
- Verifying the Patch Level of the Cisco PGW 2200 Softswitch, page 3-100
- Retrieving the Logging Level of Software Processes, page 3-102
- Retrieving the Logging Level of Software Processes, page 3-102
- Retrieving System Statistics, page 3-103

Performing a Manual Switchover

In a continuous service configuration, you can swap the roles of the active Cisco PGW 2200 Softswitch and the standby Cisco PGW 2200 Softswitch by issuing the appropriate MML command from the management interface of the active Cisco PGW 2200 Softswitch. You can accomplish a switchover only from the active Cisco PGW 2200 Softswitch, because only the active Cisco PGW 2200 Softswitch can command the standby Cisco PGW 2200 Softswitch to take over. If only one Cisco PGW 2200 Softswitch is processing all calls, it will reject a manual switchover request.

Typically, manual switchovers are performed for the following reasons:

- To periodically switch the roles of the Cisco PGW 2200 Softswitches
- To upgrade the existing software to a new release
- To bring down a system for hardware maintenance

Caution Performing a manual switchover can severely impact the call processing performance of the system. All established calls are retained, but any calls in the process of being set up might be dropped. Attempt a manual switchover only during a maintenance period when traffic is minimal.

If you need to order a manual switchover to perform maintenance or upgrade procedures on one or both of the Cisco PGW 2200 Softswitches, complete the following steps or the call engine might delete all calls. With both the active and standby Cisco PGW 2200 Softswitches operating normally, you can invoke a manual switchover from one system to the other by completing the following steps:

Step 1 Determine whether both the active and standby Cisco PGW 2200 Softswitches are operating normally, as described in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2.

Step 2 Determine whether any alarms are pending on either system, as described in the "Monitoring the Alarms Status" section on page 3-7.

If any alarms are pending, you must correct the situation that caused the alarms. Search for the corrective actions that are required to clear any alarms in the "Alarm Troubleshooting Procedures" section on page 6-4. If the alarms do not appear in that section, corrective action is not required for those alarms. See *Cisco PGW 2200 Softswitch Release 9 Messages Reference* for more information on those alarms.

Step 3 Ensure that calls are being replicated from the active Cisco PGW 2200 Softswitch to the standby Cisco PGW 2200 Softswitch, as described in the "Verifying Proper Replication of Calls" section on page 3-52.

Step 4 Enter the following MML command to synchronize the provisioning data on the standby Cisco PGW 2200 with the data on the active Cisco PGW 2200 Softswitch:

```
prov-sync
```

Caution Using the **prov-sync** MML command can severely impact the call processing performance of the system. Enter this command only during a maintenance period when traffic is minimal.

Step 5 Determine the platform state of both Cisco PGW 2200 Softswitches, as described in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2.

Step 6 Check that all processes on the active Cisco PGW 2200 Softswitch are in the running state, as described in the "Verifying That Processes Are Running" section on page 3-4.

Caution The next step forces a manual switchover to the standby Cisco PGW 2200 Softswitch. Ensure that the standby Cisco PGW 2200 Softswitch is fully operational and that debugging is turned off before taking the active Cisco PGW 2200 Softswitch OOS, or there might be a total interruption of service.

A switchover can also cause call processing to fail if debugging is turned on.

Step 7 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the following command:

```
sw-over::confirm
```

Caution Switchover operations cause the loss of all SS7 messages that are transmitted to the Cisco PGW 2200 Softswitch for approximately 3 seconds. The loss of messages affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Site alarms are automatically set until the OOS Cisco PGW 2200 Softswitch is returned to an IS state.

Step 8 Verify that the switchover completed successfully. To verify a switchover, follow the procedure that is described in the "Verifying Successful Completion of a Switchover" section on page 3-97.

Verifying Successful Completion of a Switchover

Determine whether a switchover (automatic or manual)is completed successfully by retrieving the status of each Cisco PGW 2200 Softswitch. When all of the processes are active (the time that is required for all processes to start depends on the amount of traffic), determine the platform state of both Cisco PGW 2200 Softswitches, as described in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2. If the platform state of both Cisco PGW 2200 Softswitches is as expected, the switchover is completed successfully. If one of the Cisco PGW 2200 Softswitches does not return the expected platform state, the switchover did not complete successfully. See the "Recovering from a Switchover Failure" section on page 6-170.

Understanding Switchover

Configure Cisco PGW 2200 Softswitches in an Active-Standby mode. In this mode, one Cisco PGW 2200 Softswitch runs active traffic while checkpointing information to the standby Cisco PGW 2200 Softswitch. In a continuous service configuration, the active Cisco PGW 2200 Softswitch is paired with an identical standby Cisco PGW 2200 Softswitch that automatically takes over if a failure or switchover occurs. The continuous service architecture of the Cisco PGW 2200 Softswitch increases the reliability, availability, and failure-aversion capabilities of the system.

The primary goal of the Cisco PGW 2200 Softswitch switchover subsystem is to preserve calls if a system fails. At any given time, one Cisco PGW 2200 Softswitch should be active while the other Cisco PGW 2200 Softswitch is in a standby role. The active Cisco PGW 2200 Softswitch carries out the call control function and updates the standby Cisco PGW 2200 Softswitch about call-processing events. The standby Cisco PGW 2200 Softswitch maintains the same system state (in regard to call-processing) as the active Cisco PGW 2200 Softswitch. In response to a critical failure on the active Cisco PGW 2200 Softswitch, the standby switches to the active role and takes over the call control function. There is a period of approximately 3 seconds in which all messaging is lost in the process of switching over call control.

Note If your system is a simplex configuration (a single Cisco PGW 2200 Softswitch), or is functioning in standalone mode (the standby Cisco PGW 2200 Softswitch is in the OOS service state), the system cannot perform a switchover. In these instances, the active Cisco PGW 2200 Softswitch remains in the active service state when a critical failure occurs.

Switchovers can occur automatically when a critical alarm is generated. Alternatively, you can perform a manual switchover, which typically is part of a maintenance or troubleshooting procedure. For more information on performing a manual switchover, see the "Performing a Manual Switchover" section on page 3-96.

Note When a Cisco PGW 2200 Softswitch temporarily loses IP continuity and causes an automatic switchover, the newly standby Cisco PGW 2200 Softswitch can require as many as 6 minutes to return to the in-service state.

Fault-Tolerant Components

The following component processes of the Cisco PGW 2200 Softswitch are fault-tolerant. In other words, each of these processes knows its own state (Active, Standby, Out-of-Service) and the corresponding state of its peer process on the standby system.

- Process manager (procM)—Spawns and manages all processes in the system
- Failover daemon (foverd)—Determines and switches platform states
- Call engine—Manages call-processing functions
- Replicator—Replicates call states from the active Cisco PGW 2200 Softswitch to the standby Cisco PGW 2200 Softswitch
- I/O channel controller (IOCC)—Manages the signaling messages
- I/O channel manager (IOCM)—Manages the protocol-specific IOCCs

Failover Daemon

The active Cisco PGW 2200 Softswitch runs the procM process. ProcM automatically starts when the Cisco PGW 2200 is booted. ProcM starts the alarm manager, configuration manager, call engine, IOCCs, and other processes, including foverd (the failover daemon).

The failover daemon controls the continuous service architecture. The failover daemons on both Cisco PGW 2200s coordinate the active, standby, and OOS states of those hosts.

The alarm manager process also plays a significant role in a continuous service system. The alarm manager raises the alarm when a critical event occurs and clears the alarm when the condition that caused the alarm is cleared. See *Cisco PGW 2200 Softswitch Release 9 Messages Reference* for detailed information about alarms, especially the critical alarms.

The foverd process directs manual switchovers. The switchover configuration provides the following:

- Minimal interruption of service if a single machine fails
- Maintenance of a consistent configuration on both the active and standby Cisco PGW 2200 Softswitches
- Avoidance of false switchovers that could cause disruption of service

A critical event is typically a critical process dying or the failure of a subsystem or component that can critically affect call processing. A forced switchover occurs automatically when the conditions governing it are met; it is system-initiated and not user-initiated. When a critical event occurs, the alarm manager sends a specific message to the foverd process, indicating the occurrence of the critical event.

When the failover daemon receives notification that a critical event has occurred on the active Cisco PGW 2200, the failover daemon initiates a forced switchover to the standby Cisco PGW 2200. The standby Cisco PGW 2200 transitions immediately to the active state. For approximately 3 seconds, all messaging is lost. This messaging loss affects established and new calls.

The occurrence of a critical event on system A results in its peer, system B, becoming active while system A goes to an OOS state. Until the critical event that triggered the switchover on system A is cleared, its state remains OOS. When the critical event is cleared, the alarm manager sends another message (a Clear Alarm message) to the foverd process. The foverd process directs system A to a standby state (if the peer system B is still in the active state).

When the critical event clears, the failed Cisco PGW 2200 Softswitch (A) comes back online. It can then become the standby for the currently active Cisco PGW 2200 Softswitch (B). Initially, system A is still OOS. The platform state of system A continues to be OOS until the critical event is cleared.

The Call Engine checkpoints call information from the active Cisco PGW 2200 to the standby Cisco PGW 2200. In addition, the MTP3 IOCC checkpoints the state of the SS7 network. The MTP2 terminal functionality resides on the Cisco ITP-Ls to enable the fault-tolerant MTP3 solution.

The Cisco ITP-Ls are responsible for SS7 MTP2 message processing. The Cisco ITP-Ls communicate directly with the Cisco PGW 2200 Softswitches (active and standby) using RUDP, but they send SS7 traffic only to the active Cisco PGW 2200 Softswitch.

Note The number of Cisco ITP-Ls depends on the SS7 network traffic load and on link and linkset requirements. Generally, you should have a minimum of two links per linkset. One link per Cisco ITP-L provides SS7 reliability. To further enhance redundancy, you should spread the links in a linkset across multiple Cisco ITP-Ls so that any single unit can be removed, added, or serviced without disrupting the SS7 network.

Circuit Auditing

An auditing process discovers discrepancies in circuit states between the Cisco PGW 2200 Softswitch and the media gateways it controls. During a switchover, discrepancies might exist about the state of bearer circuits (CICs) between the newly active Cisco PGW 2200 Softswitch and the bearer devices it controls. Discrepancies in circuit states between the active Cisco PGW 2200 Softswitch and the bearer devices could also occur if control messages to the bearer devices get lost.

The circuit auditing mechanism can be run periodically at configured intervals or after an automatic or manual switchover. It can also be initiated manually using the MML command, **sw-over::confirm**. The audit capability always initiates automatically upon indication of critical error conditions from solution components, adjacent SS7 switches, or when critical Cisco PGW 2200 Softswitch conditions occur. The circuit-auditing mechanism detects and resolves circuit state discrepancies that it discovers and resynchronizes the Cisco PGW 2200 and the bearer devices.

The circuit auditing mechanism is a function of the call engine process in the active Cisco PGW 2200 Softswitch. The call engine subsystem starts a thread to perform the circuit-auditing function upon notification of a switchover event from the fault manager.

The circuit auditing mechanism commands the bearer devices to reflect the circuit state of the Cisco PGW 2200 Softswitch. If a bearer device considers the circuit in use and the Cisco PGW 2200 Softswitch does not, the Cisco PGW 2200 releases the circuit. However, if the Cisco PGW 2200 Softswitch shows

that a bearer circuit is in use and discovers that the bearer device does not show that circuit is in use, the Cisco PGW 2200 Softswitch does not attempt to rebuild the call, but releases all associated resources. Although the Cisco PGW 2200 Softswitch is the controlling authority, when it discovers a discrepancy during a circuit audit, the Cisco PGW 2200 Softswitch releases all allocated resources and drops all calls.

Checkpointing

Checkpointing of calls ensures that established calls are preserved if a switchover occurs. The Call Engine sends checkpoint events to the local checkpoint process at one point during call setup and at one point in the call release phase.

Checkpointing is also applied to the following protocol supervisory messages and MML commands that change the logical state of the bearer circuits:

- Blocking and Unblocking Messages and Commands
- Circuit Reset Messages and Commands

The local checkpointing process is responsible for securing these events to disk if the standby Cisco PGW 2200 is unavailable and for forwarding those events to the remote checkpointing process when it does become available. If the standby Cisco PGW 2200 Softswitch is running, checkpoint events are batched and forwarded to the remote checkpointing process.

The remote checkpointing process is responsible for processing the checkpoint events from the active Cisco PGW 2200 Softswitch, delivering only established calls to the remote call engine. The remote call engine process begins checkpointing events for calls when it begins active call processing.

The following scenarios are supported:

- Standalone (no standby Cisco PGW 2200 Softswitch available)—Specify the activation or deactivation of checkpointing. If checkpointing is activated, all checkpoint events are secured to disk.
- Startup (standby Cisco PGW 2200 Softswitch unavailable)—Local checkpointing process retains or secures all events until the standby Cisco PGW 2200 Softswitch is available and a request for synchronization is completed.
- Synchronization—Request synchronization of the configurations of the two Cisco PGW 2200s. This request is required after startup and transition from the standalone Cisco PGW 2200 Softswitch to the standby available configuration.
- Switchover—If a switchover occurs, the standby Cisco PGW 2200 Softswitch assumes the primary responsibility for processing calls and securing checkpoint events.

Checkpointing is also implemented to support forward Cisco PGW 2200 Softswitch software migration by one release. Manually direct the standby Cisco PGW 2200 Softswitch out of service, upgrade the software to the new release, and resynchronize calls with the active Cisco PGW 2200 Softswitch. For detailed procedures on upgrading the Cisco PGW 2200 Softswitch software, see *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Verifying the Patch Level of the Cisco PGW 2200 Softswitch

As of Release 9.2 of the Cisco PGW 2200 Softswitch software, you can verify the patch level of your Cisco PGW 2200 Softswitch software by performing the following steps:

Step 1 Display the current patch level of your system by logging into the active Cisco PGW 2200 Softswitch as root and entering the following UNIX command:

```
pkginfo | grep Patch
```

The system returns a response like the following:

```
application CSCOgp003      Cisco Media Gateway Controller Software Patch Package
application CSCOgp009      Cisco Media Gateway Controller Software Patch Package
application CSCOgs003      Cisco Media Gateway Controller Software Patch Package
system      SUNWswmt       Patch Utilities
```

Look for the Cisco PGW 2200 Softswitch patch with the largest number to determine the current patch level. In the example, the current protocol patch level is patch 9 (CSCOgp009), whereas the system patch level is patch 3 (CSCOgs003).

Note For more information on the patches to the release of the Cisco PGW 2200 Softswitch software you are running, see the release notes associated with your release. To determine which release of the Cisco PGW 2200 Softswitch software you are running, enter the **rtrv-ne** MML command, as described in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2.

Step 2 Determine the patches available for your version of Cisco PGW 2200 Softswitch software by entering the following URL:

http://www.cisco.com/kobayashi/sw-center/sw-voice.shmtl

Select your software version from the list. A list of currently available patches displays.

If you find that your patch level matches the current patch level on the web page, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Download the latest patches and associated installation instruction files to the active Cisco PGW 2200 Softswitch.

Step 4 Open the instruction files and follow the procedures to install the patches.

Step 5 Once you have installed the new patches, run the check inventory utility to ensure that the patches installed correctly by entering the following UNIX commands:

Caution Do not run the inventory utility while the system is actively processing calls, because it can reduce the call processing rate.

Note To run the inventory utility, you must have root permissions. If you are not logged in as root, you must enter the UNIX command **sudo** before the utility name to ensure proper execution.

```
cd /opt/CiscoMGC/bin
chk_inv [>file_path]
```

Note You must be in the /opt/CiscoMGC/bin directory to run the check inventory utility.

Where *file_path* is an optional parameter that is used when you want to redirect the output of the utility to a file. If you do not redirect the output to a file, the results are written to your screen.

For example, to redirect the results of the check inventory utility to a file called inv.out, enter the following command:

```
chk_inv >/opt/CiscoMGC/local/inv.out
```

Step 6 Review the utility results either on-screen or by opening the file. If the results indicate that there are no problems with the installation, the procedure is complete. Otherwise, proceed to Step 7.

Caution The check inventory utility uses a 32-bit cyclic redundancy check (CRC) to verify your system software. A 32-bit CRC can have a value anywhere from 1 to over 4 billion. However, there is a slight possibility that two sets of data can have the same CRC value. If this anomaly occurs, you will receive a false positive from the utility.

Note If the utility results indicate that there is a problem with a part of the software outside of the Cisco PGW 2200 Softswitch software patches, you should determine whether a problem truly exists. The utility compares the software on your system to a master list. It is possible that your environment might not use all of the software on that master list. If the utility indicates that a piece of software is missing, and your system configuration does not use that software, you do not need to load that software. However, if the utility identifies a problem with other software, and your system uses that software, proceed to Step 8.

Step 7 Re-install the patches, repeating Step 3 through Step 6. If your second attempt at downloading and installing the patches succeeds, the procedure is complete. Otherwise, proceed to Step 8.

Step 8 Collect system according to the directions provided in the "Collecting System Data for Cisco TAC" section on page 6-93 and contact the Cisco TAC to further analyze the problem and determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Retrieving the Logging Level of Software Processes

You can use the **rtrv-log** MML command to retrieve the current logging level of a single process or of all of the processes. For more information on processes, see "Understanding Processes" section on page 3-5.

To retrieve the current logging level of a single process, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-log:*process*** command:

Where:

process is the MML name of the desired process. For a list of valid process names, see the "Understanding Processes" section on page 3-5.

For example, to retrieve the current logging level of the call engine process (eng-01), enter the **rtrv-log:eng-01** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-16 09:38:03
M  RTRV
   "ENG-01:INFO"
```

To retrieve the current logging level of all the processes, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-log:all** command:

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-16 09:38:03
M  RTRV
   "ENG-01:INFO"
```

Note The process manager (PM-01) is not included in the "all" parameter because this process requires special treatment. To retrieve the logging level of PM-01, you must specify it individually with the command, as shown in the preceding example.

Retrieving System Statistics

You can retrieve various system statistics for the Cisco PGW 2200 Softswitch using the MML command, **rtrv-ne-health**, and its subcommands. The system statistics are described in the following paragraphs:

- Retrieving System State and Alarm Statistics, page 3-103
- Retrieving Calling Statistics, page 3-103
- Retrieving System Usage Statistics, page 3-104

Retrieving System State and Alarm Statistics

To display the platform state and alarm statistics, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-ne-health::sys** command:

The system returns a message like the following:

```
Media Gateway Controller 2000-06-07 16:39:41
M  RTRV
   "Platform State:ACTIVE"
   "2 critical, 4 major, 8 minor active alarms"
```

If the platform state is not the value you expected, enter the same command on the other Cisco PGW 2200 Softswitch to determine if it is the active Cisco PGW 2200 Softswitch. If the other Cisco PGW 2200 Softswitch is also not the active Cisco PGW 2200 Softswitch, contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

If you detect that alarms are active, you can find the current alarms by using the procedure in the "Retrieving All Active Alarms" section on page 6-3.

Retrieving Calling Statistics

Enter the following MML command on the active Cisco PGW 2200 Softswitch to display the machine congestion level, calls in progress, CPU utilization, and call success and failure statistics:

```
rtrv-ne-health::callp
```

The system returns a message like the following:

```
   MGC-01 - Media Gateway Controller 2008-10-08 01:33:20.530 EDT
M  COMPLD
   "Platform State:ACTIVE"
   "0 critical, 0 major, 0 minor active alarms"
   "Machine Congestion Level = MCL 0 (No Congestion), Reason: not applicable"
   "Current in progress calls = 0, half calls = 0, full calls = 0, call attempts= 0 cps"
   "CPU 0 Utilization = 0 % CPU 1 Utilization = 0 %"
```

```
   "Memory (KB): 5131609 Free virtual, 5872025 Total virtual, 2097152 Total real, 0 Total
Dial Plan"
   "Interval (minutes)           15      60      1440"
   "CALL: SuccCall TOT           0       0       0"
   "CALL: FailCall TOT           0       0       0"
   "CALL: SIPLicRej TOT          0       0       0"
   "CALL: H323LicRej TOT         0       0       0"
   "CALL: TDMLicRej TOT          0       0       0"
   "CALL: TimesTenLicRej TOT     0       0       0"
   ;
```

Note In a single instance, the number of in-progress calls does not reflect the actual number of active calls. When an E1 link in a PBX comes up, the Cisco PGW 2200 Softswitch sends CRMs to the PBX for each channel to ensure that there are no active calls present in the PBX. The system sends CRMs to ensure that synchronization can be maintained after a link failure on the IP side. These CRMs are treated as active calls, which increases the number of in-progress calls returned by this command.

If the Cisco PGW 2200 Softswitch uses many CPU resources over an extended period, you should contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

Retrieving System Usage Statistics

Enter the following MML command on the active Cisco PGW 2200 Softswitch to display the processor, memory, and file system usage statistics:

```
rtrv-ne-health::load
```

The system returns a message like the following:

```
   MGC-01 - Media Gateway Controller 2008-10-08 01:41:25.179 EDT
M  COMPLD
   "Platform State:ACTIVE"
   "0 critical, 0 major, 0 minor active alarms"
   "Machine Congestion Level = MCL 0 (No Congestion), Reason: not applicable"
   "Current in progress calls = 0, half calls = 0, full calls = 0, call attempts= 0 cps"
   "CPU 0 Utilization = 0 % CPU 1 Utilization = 0 %"
   "Memory (KB): 5131609 Free virtual, 5872025 Total virtual, 2097152 Total real, 0 Total
Dial Plan"
   "Filesystem            kbytes    used   avail capacity  Mounted on"
   "/dev/md/dsk/d3       1988623  500185 1428780    26%    /"
   "/dev/md/dsk/d12      57440581 9876786 46989390    18%    /opt"
   ;
```

Note In a single instance, the number of in-progress calls does not reflect the actual number of active calls. When an E1 link in a PBX comes up, the Cisco PGW 2200 Softswitch sends CRMs to the PBX for each channel to ensure that there are no active calls present in the PBX. The system sends CRMs to ensure that synchronization can be maintained after a link failure on the IP side. These CRMs are treated as active calls, which increases the number of in-progress calls returned by this command.

If many CPU resources are being used over an extended period, you should contact the Cisco TAC for assistance. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information on contacting the Cisco TAC.

If the response to the command indicates that the system is using 90 percent or more of its disk capacity, you must delete files from your disk drive, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

Managing System Measurements

The following sections describe the operations to manage the Cisco PGW 2200 Softswitch system measurements:

- Retrieving Measurements, page 3-105
- Clearing Measurements, page 3-106
- Retrieving Link or Linkset Measurements, page 3-106
- Retrieving SS7 Signaling Point Measurements, page 3-108
- Retrieving Measurement Thresholds, page 3-117
- Modifying Measurement Thresholds, page 3-117

Retrieving Measurements

View and search the measurements results that are stored in the measurements log file using the measurement viewer that is included in the Cisco MGC viewer toolkit. For more information on viewing and searching measurement log files, see the "Viewing and Searching System Measurement Files" section on page 3-131. For more information on log files, see Appendix A, "Configuring Cisco PGW 2200 Softswitch Log Files.".

The measurement category and component identification number uniquely defines each measurement (or counter). You can retrieve individual measurements using the following MML command from the active Cisco PGW 2200 Softswitch:

rtrv-ctr:*comp*:"*meas_cat*"

Where:

- *comp*—MML name of the component. A complete list of components can be found in the *Cisco PGW 2200 Softswitch Release 9 MML Command Reference*. You can retrieve a list of provisioned components by entering the **prov-rtrv:all** MML command.
- *meas_cat*—Desired measurement category. You can find a complete list of measurement categories in Appendix D, "Cisco PGW 2200 Softswitch Measurements."

For example, to view the ISUP IAM transmission measurement totals for a component called dpc1, enter the **rtrv-ctr:dpc1:"ISUP: XMIT IAM TOT"** command:

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2000-07-11 10:15:50
M  RTRV
   "dpc1:CAT=\"ISUP: XMIT IAM TOT\",INT=300,VAL=353"
   "dpc1:CAT=\"ISUP: XMIT IAM TOT\",INT=1800,VAL=2501"
```

Clearing Measurements

The measurement category and component identification number uniquely defines each measurement (or counter). Retrieve individual measurements using the following MML command from the active Cisco PGW 2200 Softswitch:

clr-ctr:*comp*:"*meas_cat*"

Where:

- *comp*—MML name of the component. For a complete list of components, see the *Cisco PGW 2200 Softswitch Release 9 MML Command Reference*. You can retrieve a list of selected provisioned components by entering the **prov-rtrv:all** MML command.
- *meas_cat*—Desired measurement category. You can find a complete list of measurement categories in Appendix D, "Cisco PGW 2200 Softswitch Measurements."

For example, to clear the ISUP IAM transmission measurement totals for a component called dpc1, enter the **clr-ctr:dpc1: "ISUP: XMIT IAM TOT"** command.

Retrieving Link or Linkset Measurements

Use the **rtrv-lnk-ctr** MML command to retrieve the system measurements for a single link, all the links in a linkset, or all links. For a complete list of system measurements, see Appendix D, "Cisco PGW 2200 Softswitch Measurements."

To retrieve a list of system measurements for a single link, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-lnk-ctr:*link*** command.

Where:

link is the MML name of the SS7 link.

For example, to view the measurements for a link that is called ls1link1, enter the **rtrv-lnk-ctr:ls1link1** command.

The system returns a response like the following:

```
MGC-03 - Media Gateway Controller 2000-08-22 16:32:23
M  RTRV
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"C7LNK: MSU DROP-CONG\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: DUR UNAVAIL\",INT=1800,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=86400,VAL=0"
"ls1link1:CAT=\"C7LNK: DUR IS\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: RCV SIO TOT\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: XMIT SIO TOT\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: RCV SU ERR\",INT=1800,VAL=0"
```

To retrieve a list of system measurements for the links that make up a linkset, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-lnk-ctr:*linkset*** command:

Where:

linkset is the MML name of the SS7 linkset.

For example, to view the measurements for each link within a linkset that is called ls1, you would enter the **rtrv-lnk-ctr:ls1link1** command:

The system returns a response like the following:

```
MGC-03 - Media Gateway Controller 2000-08-22 16:32:23
M  RTRV
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD TOT\",INT=86400,VAL=0"
"ls1link1:CAT=\"C7LNK: MSU DROP-CONG\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: DUR UNAVAIL\",INT=1800,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=900,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=3600,VAL=0"
"ls1link1:CAT=\"SC: RCV BAD CRC\",INT=86400,VAL=0"
"ls1link1:CAT=\"C7LNK: DUR IS\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: RCV SIO TOT\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: XMIT SIO TOT\",INT=1800,VAL=0"
"ls1link1:CAT=\"C7LNK: RCV SU ERR\",INT=1800,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=86400,VAL=0"
"ls1link2:CAT=\"C7LNK: MSU DROP-CONG\",INT=1800,VAL=0"
"ls1link2:CAT=\"C7LNK: DUR UNAVAIL\",INT=1800,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD CRC\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD CRC\",INT=3600,VAL=0"
"ls1link2 CAT=\"SC: RCV BAD CRC\",INT=86400,VAL=0"
"ls1link2:CAT=\"C7LNK: DUR IS\",INT=1800,VAL=0"
"ls1link2:CAT=\"C7LNK: RCV SIO TOT\",INT=1800,VAL=0"
"ls1link2:CAT=\"C7LNK: XMIT SIO TOT\",INT=1800,VAL=0"
"ls1link2:CAT=\"C7LNK: RCV SU ERR\",INT=1800,VAL=0"
```

To retrieve a list of system measurements for all the links on your Cisco PGW 2200 Softswitch, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-lnk-ctr:all** command:

The system returns a response like the following:

```
MGC-03 - Media Gateway Controller 2000-08-22 16:32:23
M  RTRV
"ls1link1:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
```

```
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=900,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=3600,VAL=0"
"ls1link2:CAT=\"SC: RCV BAD TOT\",INT=86400,VAL=0"
"ls2link1:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls2link1:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls2link1:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls2link1:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
"ls2link1:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls2link1:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls2link1:CAT=\"C7LNK: RCV SU ERR\",INT=1800,VAL=0"
"ls2link2:CAT=\"SC: RCV FRM TOT\",INT=900,VAL=0"
"ls2link2:CAT=\"SC: RCV FRM TOT\",INT=3600,VAL=0"
"ls2link2:CAT=\"SC: RCV FRM TOT\",INT=86400,VAL=0"
"ls2link2:CAT=\"SC: XMIT FRM TOT\",INT=900,VAL=0"
"ls2link2:CAT=\"SC: XMIT FRM TOT\",INT=3600,VAL=0"
"ls2link2:CAT=\"SC: XMIT FRM TOT\",INT=86400,VAL=0"
"ls2link2:CAT=\"SC: RCV BAD TOT\",INT=900,VAL=0"
"ls2link2:CAT=\"SC: RCV BAD TOT\",INT=3600,VAL=0"
```

Retrieving SS7 Signaling Point Measurements

You can use the **rtrv-sp-ctr** MML command to retrieve the system measurements for a single SS7 signaling point or for all SS7 signaling points. For a complete list of system measurements, see Appendix D, "Cisco PGW 2200 Softswitch Measurements."

To retrieve a list of system measurements for a single SS7 signaling point, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-sp-ctr:*point_code*** command:

Where:

point_code is the MML name of the SS7 signaling point.

For example, to view the measurements for a point code that is called dpc2, enter the **rtrv-sp-ctr:dpc2** command:

The system returns a response like the following:

```
MGC-02 - Media Gateway Controller 2001-06-13 14:08:39
M  RTRV
   "dpc2:CAT=\"ISUP: XMIT BLA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT BLA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: CHAN MATE UNAVAILABLE\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: CHAN MATE UNAVAILABLE\",INT=1800,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=86400,VAL=8"
   "dpc2:CAT=\"SP: PDU in\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: PDU in\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: PDU in\",INT=86400,VAL=50"
   "dpc2:CAT=\"ISUP: XMIT CGB TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CGB TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CQM TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CQM TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CVR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CVR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV LPA TOT\",INT=300,VAL=0"
```

```
"dpc2:CAT=\"ISUP: RCV LPA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RSC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RSC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT ACM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT ACM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UBA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UBA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT MSG TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT MSG TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CCR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CCR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV UBA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV UBA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV MSG TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV MSG TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: UNEX MSG TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: UNEX MSG TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT IAM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT IAM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV IAM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV IAM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: UNREC MSG TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: UNREC MSG TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CFN TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CFN TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CCR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CCR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT ANM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT ANM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT COT TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT COT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV ANM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV ANM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV INR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV INR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV COT TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV COT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT BLO TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT BLO TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: ABN REL TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: ABN REL TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT REL TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT REL TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CVR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CVR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGU TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGU TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT SUS TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT SUS TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CVT TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CVT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT GRA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT GRA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV SUS TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV SUS TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV FOT TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV FOT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV GRS TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV GRS TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CFN TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CFN TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UBL TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UBL TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CVT TOT\",INT=300,VAL=0"
```

```
"dpc2:CAT=\"ISUP: RCV CVT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT LPA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT LPA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT FAC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT FAC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV FAC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV FAC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGUA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGUA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV UBL TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV UBL TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT USR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT USR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGUA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGUA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV USR TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV USR TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV ACM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV ACM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT FOT TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT FOT TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT PAM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT PAM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGB TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGB TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV RLC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV RLC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV REL TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV REL TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CRM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CRM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGBA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGBA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RLC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RLC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"C7SP: SP DUR UNAVAIL\",INT=300,VAL=0"
"dpc2:CAT=\"C7SP: SP DUR UNAVAIL\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CRM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CRM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV UCIC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV UCIC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGBA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV CGBA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"C7SP: XMIT MSU DROP/RTE\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT GRS TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT GRS TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV RSC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV RSC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RES TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT RES TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UCIC TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT UCIC TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV RES TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV RES TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV PAM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV PAM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV GRA TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV GRA TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT EXM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT EXM TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGU TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: XMIT CGU TOT\",INT=1800,VAL=0"
"dpc2:CAT=\"ISUP: RCV EXM TOT\",INT=300,VAL=0"
"dpc2:CAT=\"ISUP: RCV EXM TOT\",INT=1800,VAL=0"
```

```
   "dpc2:CAT=\"ISUP: XMIT INF TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT INF TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQM TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQM TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV INF TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV INF TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLO TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLO TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"SP: cInit in\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: cInit in\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: cInit in\",INT=86400,VAL=17"
   "dpc2:CAT=\"ISUP: XMIT CPG TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CPG TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"SP: PDU out\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: PDU out\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: PDU out\",INT=86400,VAL=99"
   "dpc2:CAT=\"ISUP: RCV CQR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CQR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CRA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CRA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CPG TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CPG TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT INR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT INR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CRA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CRA TOT\",INT=1800,VAL=0"
```

To retrieve a list of system measurements for all the SS7 signaling points on your

Cisco PGW 2200 Softswitch, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-sp-ctr:all** command:

The system returns a response like the following:

```
MGC-02 - Media Gateway Controller 2001-06-13 14:08:39
M  RTRV
   "opc2"
   /* No active counters found for this component/category */
   "dpc2:CAT=\"ISUP: XMIT BLA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT BLA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: CHAN MATE UNAVAILABLE\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: CHAN MATE UNAVAILABLE\",INT=1800,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: cInit out\",INT=86400,VAL=8"
   "dpc2:CAT=\"SP: PDU in\",INT=900,VAL=0"
   "dpc2:CAT=\"SP: PDU in\",INT=3600,VAL=0"
   "dpc2:CAT=\"SP: PDU in\",INT=86400,VAL=50"
   "dpc2:CAT=\"ISUP: XMIT CGB TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CGB TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV BLA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CQR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CQM TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV CQM TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CVR TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT CVR TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: RCV LPA TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: RCV LPA TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT RSC TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT RSC TOT\",INT=1800,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT ACM TOT\",INT=300,VAL=0"
   "dpc2:CAT=\"ISUP: XMIT ACM TOT\",INT=1800,VAL=0"
```

```
"dpc2:CAT=\"ISUP: XMIT UBA TOT\",INT=300,VAL=0"
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"dpc1:CAT=\"ISUP: XMIT CQM TOT\",INT=1800,VAL=0"
"dpc1:CAT=\"ISUP: RCV INF TOT\",INT=300,VAL=0"
"dpc1:CAT=\"ISUP: RCV INF TOT\",INT=1800,VAL=0"
"dpc1:CAT=\"SP: cInit in\",INT=900,VAL=0"
"dpc1:CAT=\"SP: cInit in\",INT=3600,VAL=0"
"dpc1:CAT=\"SP: cInit in\",INT=86400,VAL=5"
"dpc1:CAT=\"ISUP: RCV BLO TOT\",INT=300,VAL=0"
"dpc1:CAT=\"ISUP: RCV BLO TOT\",INT=1800,VAL=0"
"dpc1:CAT=\"ISUP: XMIT CPG TOT\",INT=300,VAL=0"
"dpc1:CAT=\"ISUP: XMIT CPG TOT\",INT=1800,VAL=0"
"dpc1:CAT=\"SP: PDU out\",INT=900,VAL=0"
"dpc1:CAT=\"SP: PDU out\",INT=3600,VAL=0"
"dpc1:CAT=\"SP: PDU out\",INT=86400,VAL=19"
"dpc1:CAT=\"ISUP: RCV CQR TOT\",INT=300,VAL=0"
"dpc1:CAT=\"ISUP: RCV CQR TOT\",INT=1800,VAL=0"
"dpc1:CAT=\"ISUP: XMIT CRA TOT\",INT=300,VAL=0"
"dpc1:CAT=\"ISUP: XMIT CRA TOT\",INT=1800,VAL=0"
```

```
   "dpc1:CAT=\"ISUP: RCV CPG TOT\",INT=300,VAL=0"
   "dpc1:CAT=\"ISUP: RCV CPG TOT\",INT=1800,VAL=0"
   "dpc1:CAT=\"ISUP: XMIT INR TOT\",INT=300,VAL=0"
   "dpc1:CAT=\"ISUP: XMIT INR TOT\",INT=1800,VAL=0"
   "dpc1:CAT=\"ISUP: RCV CRA TOT\",INT=300,VAL=0"
   "dpc1:CAT=\"ISUP: RCV CRA TOT\",INT=1800,VAL=0"
```

Retrieving Measurement Thresholds

Each measurement has a profile that contains information concerning the time intervals, or thresholds, for reporting measurements. A profile can have unique thresholds that are set for 15-minute, 60-minute, and 24-hour intervals. Thus, each measurement can have up to three thresholds in its profile.

To retrieve the thresholds for a particular measurement, enter the **rtrv-thres::"meas_cat"** command:

Where:

meas_cat is the desired measurement category.

For example, to display the threshold settings for the measurement category, SIP: RETX MSG TOT, enter the **rtrv-thres::"SIP: RETX MSG TOT"** command:

Text like the following is displayed:

```
   MGC-01 - Media Gateway Controller 2008-10-24 01:40:57.770 EDT
M  RTRV
   "SIP: RETX MSG TOT"
   ":INT=1800,"
   ":type=upper,clrthres=100,almthres=125,alarmcat=\"SIP: RE-XMIT MSG TOT\""
   ;
```

The INT field lists the thresholds for the 15-minute (900 seconds), 60-minute (3600 seconds) and 24-hour (86,400 seconds) intervals. The type field identifies the threshold type, in this case, *upper*. The type field has two possible values, *upper* or *down*. *Upper* indicates that the alarm is generated when the measurement value rises above the alarm threshold value. The alarm is cleared when the measurement value falls below the clear threshold value. *Down* indicates that the alarm is generated when the measurement value falls below the alarm threshold. The alarm is cleared when the measurement value rises above this value.

The response also shows the clear threshold value (clrthres), the alarm threshold value (almthres), and the alarm category that is associated with the measurement (alarmcat).

Modifying Measurement Thresholds

You can modify the thresholds for the system measurements. To modify the thresholds, enter the following MML command at the active Cisco PGW 2200 Softswitch:

set-thres::cat="*meas_cat*",interval=*seconds*,THRES=*value*

Where:

- *meas_cat*—Measurement category to modify.
- *seconds*—Number of seconds in the interval. The valid values are 900 for the 15-minute, 3600 for the 60-minute, and 86400 for the 24-hour interval.
- *value*—Desired threshold value.

To set the threshold to a value of 125 in the 30-minute (1800 seconds) interval for the SIP: RETX MSG TOT measurement category, enter the following command:

```
set-thres::cat="SIP: RETX MSG TOT",interval=1800, thres=125
```

Managing Call Detail Records

CDRs contain call billing records for your system. The Cisco PGW 2200 Softswitch stores the CDRs in log files. For more information on log files, see Appendix A, "Configuring Cisco PGW 2200 Softswitch Log Files." For more information on CDRs, see *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*.

The following sections present procedures for managing CDR log files:

- Converting Individual CDR Files to ASCII Format, page 3-118
- Converting Individual CDR Files to a Readable Format, page 3-118

Converting Individual CDR Files to ASCII Format

You can convert individual CDR log files from their binary storage format to a comma-separated-value (CSV) format by entering the following UNIX command at the active Cisco PGW 2200 Softswitch:

MGC_Toolkit cdrconvert -input *cdrlogfile* -output *filename* -outformat 1 [-follow]

Where:

- *cdrlogfile*—Name of the CDR log file to convert, including the file path.
- *filename*—Name for the file that is output when this command executes, including the file path.
- -outformat 1—Specifies that the output file should be in CSV format.
- -follow—Used when you are converting the active CDR file. Processing of the active CDR file continues as CDR logs are created in the active file. Processing stops when you enter Control-C.

To convert an archived CDR log file from binary format to CSV format, enter the following UNIX command:

```
MGC_Toolkit cdrconvert -input /opt/CiscoMGC/var/spool/cdr_20011113100350_002172.bin
-output /tmp/cdr.csv -outformat 1
```

The output file stores the CDR log file data in a manner like the following:

```
1090,,1,2001/Nov/13 EST 10:3:50,0X0000000000000000,2001/Nov/13 10:3:50
,MGC-CDR-NODE-STRING 1100,,1,2001/Nov/13 EST 10:18:50,0X0000000000000000,2001/Nov/13 EST
10:18:50,2,MGC-CDR-NODE-STRING
```

Converting Individual CDR Files to a Readable Format

View the CDR results that are stored in the CDR log file using the CDR viewer that is included in the Cisco MGC viewer toolkit. For more information on viewing CDR log files using the CDR viewer, see the "Using the Call Detail Record Viewer" section on page 3-123.

Also convert the contents of individual CDR log files to a readable format using the following UNIX command entered at the active Cisco PGW 2200 Softswitch:

MGC_Toolkit cdrconvert -input *cdrlogfile* -output *filename* -outformat 2 [-follow]

Where:

- *cdrlogfile*—Name of the CDR log file to convert, including the file path.

- *filename*—Name for the file that is output when this command executes, including the file path.
- -outformat 2—Specifies that the output file should be in a readable format.
- -follow—Used when you are converting the active CDR file. Processing of the active CDR file continues as CDR logs are created in the active file. Processing stops when you enter Control-C.

To convert an archived CDR log file from binary format to a readable format, enter the following UNIX command:

```
MGC_Toolkit cdrconvert -input /opt/CiscoMGC/var/spool/cdr_20011113100350_002172.bin
-output /tmp/cdr.csv -outformat 2
```

The output file stores the CDR data in a manner like the following:

```
0X0000000000000000 ----------------------------------------
0X0000000000000000 File_Header(1090)
0X0000000000000000 Unique_Call_ID(5000):
0X0000000000000000 Ver(4000): 1
0X0000000000000000 Create_Tm(4001): 2001/Nov/13 10:3:50 EST
0X0000000000000000 Call_Ref_ID(4002): 0X0000000000000000
0X0000000000000000 File_Start_Time(6001): 2001/Nov/13 10:3:50 EST
0X0000000000000000 Host_ID(6000): MGC-CDR-NODE-STRING
0X0000000000000000 MGC_Version(6004): "9.1(4.3)"
0X0000000000000000 ----------------------------------------

0X0000000000000000 ----------------------------------------
0X0000000000000000 File_Footer(1100)
0X0000000000000000 Unique_Call_ID(5000):
0X0000000000000000 Ver(4000): 1
0X0000000000000000 Create_Tm(4001): 2001/Nov/13 10:18:50 EST
0X0000000000000000 Call_Ref_ID(4002): 0X0000000000000000
0X0000000000000000 File_End_Time(6002): 2001/Nov/13 10:18:50 EST
0X0000000000000000 Total_CDBNum(6003): 2
0X0000000000000000 Host_ID(6000): MGC-CDR-NODE-STRING
0X0000000000000000 MGC_Version(6004): "9.1(4.3)"
0X0000000000000000 ----------------------------------------
```

Using the Cisco MGC Viewer Toolkit

This section describes the various components of the Cisco MGC viewer toolkit. Use the Cisco MGC viewer toolkit to view different types of files on the Cisco PGW 2200 Softswitch. This section describes the toolkit and its various components.

The Cisco MGC viewer toolkit includes a suite of viewing tools that run on the Cisco PGW 2200 Softswitch to provide quick and efficient access to diagnostic and troubleshooting information.

The following sections describe the listed viewers:

- Launching the Cisco MGC Toolbar, page 3-120
- Using the Alarm Viewer, page 3-121
- Using the Call Detail Record Viewer, page 3-123
- Using the Config-Lib Viewer, page 3-127
- Using the Log Viewer, page 3-128
- Using the Measurement Viewer, page 3-131
- Using the Trace Viewer, page 3-134
- Using the Translation Verification Viewer, page 3-134

- Using the File Options Viewer, page 3-140
- Using the MGC Backup Viewer, page 3-141
- Using the MGC Restore Viewer, page 3-141

The Cisco MGC toolbar (Figure 3-1) is a GUI application that is used to launch the various viewers in the toolkit. Each application runs independently of the others. The toolbar includes a button for launching each application in the toolkit.

Figure 3-1 Cisco MGC Toolbar

You can run multiple instances of the Cisco MGC toolbar at one time, but only one instance of each tool at a time. If the selected application is already running, a message is displayed stating that your user ID and the application are already running. However, different tools can run simultaneously. There is also a **Close** button on the toolbar, which is used to close the toolbar; however, closing the toolbar does not stop toolkit applications that are already running.

Caution Foreground (text) and background (non-text) settings can conflict if your local display settings conflict with the toolkit color settings. This conflict can render the text within various fields in the toolkit applications unreadable.

If you have problems reading text on any of the toolkit screens, change the foreground color to a darker color on your display to see if that solves the problem.

Launching the Cisco MGC Toolbar

To launch the Cisco MGC toolbar, log in to the active Cisco PGW 2200 Softswitch, and enter the following command at the UNIX prompt:

```
MGC_Toolkit
```

Note For optimal performance, set your display to 1024 pixels.

Note If you are using the xterm server to log into the active Cisco PGW 2200 Softswitch, use the following UNIX command to set the DISPLAY parameter:
export DISPLAY=*server IP address*:*port*

Then run the following UNIX command on your xterm server.
xhost +

The system displays the MGC Toolbar window.

Using the Alarm Viewer

The alarm viewer enables you to view and search records that reside in the current and archived alarm record logs. The formats of the various alarm records are specified in the *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

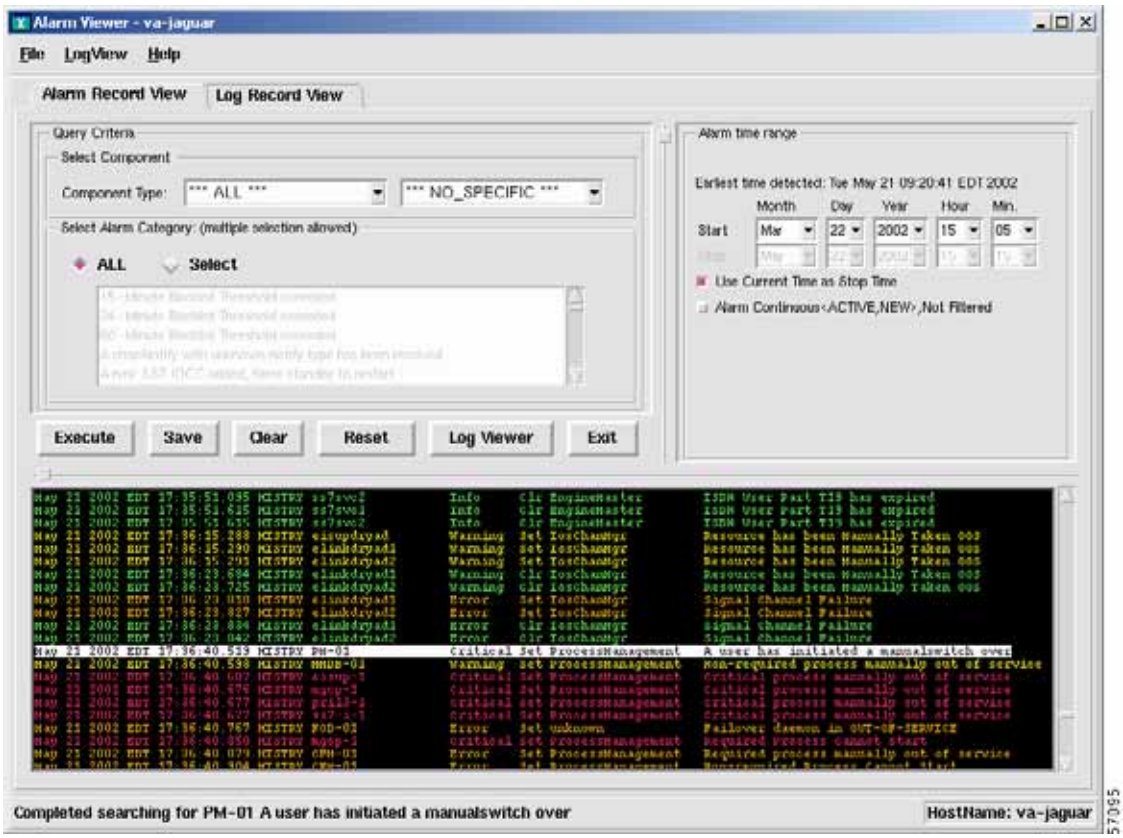
The alarm viewer includes a help file, which contains information about the viewer. To access this information, click the **Help** menu, then select **ReadMe**. The help text appears. You can also access a listing of the current alarm log files by clicking the **File** menu and selecting the Alarm List option. You can exit the alarm viewer in one of two ways: in the Query Criteria portion of the window, click **Exit** or, from the **File** menu, select **Exit**.

Viewing and Searching Alarm Record Files

Complete the following steps to view and search various system alarm files:

Step 1 To open the alarm viewer, click **Alarm Viewer** on the Cisco MGC toolbar. A popup window displays, which warns you that running this tool can affect system performance, and asks if you want to launch the tool. Click **Yes** to continue. The Alarm Viewer window loads and displays (as shown in Figure 3-2).

Figure 3-2 Alarm Viewer Window



Step 2 To view current alarms as they occur, check the **Alarm Continuous<ACTIVE, NEW>,Not Filtered** check box. The tool displays the current alarms in the field at the bottom of the viewer. Alarms appear in the field as they occur. To stop displaying current alarms, uncheck the check box.

Step 3 Search for alarms that occurred between dates and times, by specifying month, day, year, hour, and minute settings. Choose a starting date and time from the Start Date/Time drop-down lists. Then choose a stop date and time from the Stop Date/Time drop-down lists.

The current date and time are the default values for both the start and stop values for the time period; however, using these default values results in a null search (no records).

If you select the **Use Current Time as Stop Time** check box, you disable the Stop Date/Time drop-down lists and enable a search until the current date and time.

Step 4 To search by a component, choose a component type from the Component Type drop-down list. To search by a component or to view the entire contents of the files, choose the ALL entry.

From the drop-down list to the right of the Component Type list, choose subcomponents for the component you selected. To specify an individual subcomponent, or to view the entire contents of the files, choose the *NO_SPECIFIC* entry.

Step 5 To search by an alarm category, select a category type from the alarm category pane. To select one or more alarm categories, click the Select check box and select the alarm categories (to select multiple categories, hold down the **Ctrl** key while selecting). To avoid searching by a category, or to view the entire contents of the file), check the *ALL* check box.

Step 6 Click **Execute** to search the files within the chosen time frame. The contents display as multicolored text in the field at the bottom of the window. (See Figure 3-2.)

The following list describes the text colors that are associated with each alarm severity level:

- Comments—White
- Cleared—Green
- Information—Blue
- Warning—Yellow
- Error—Orange
- Critical—Red

Step 7 To view the logs that might be associated with an alarm, click **Log Viewer.** The Log Record View tab window appears (see Figure 3-3). By default, the viewer searches the platform log files for related logs that occurred within 60 seconds before and after the alarm occurred.

To modify the criteria for the related logs search, click the **LogView** menu. The **LogView** menu has two options. One option modifies the name of the log file to search (the log file prefix). The other option modifies the period for which the search occurs (the log time range).

To modify the name of the log file to search, click the **LogView** menu and choose the **Log File Prefix** option. The Log File Prefix window displays. Select the contents of the Log File Prefix field and enter the desired log filename. Click **Set** to close this window.

To modify the period of the search, click the **LogView** menu and choose the **Log Time Range** option. The Log Time Range window displays. Choose the contents of the Time Before Alarm field and enter the desired period in seconds. Choose the contents of the Time After Alarm field and enter the desired period in seconds. Click **Set** to close this window.

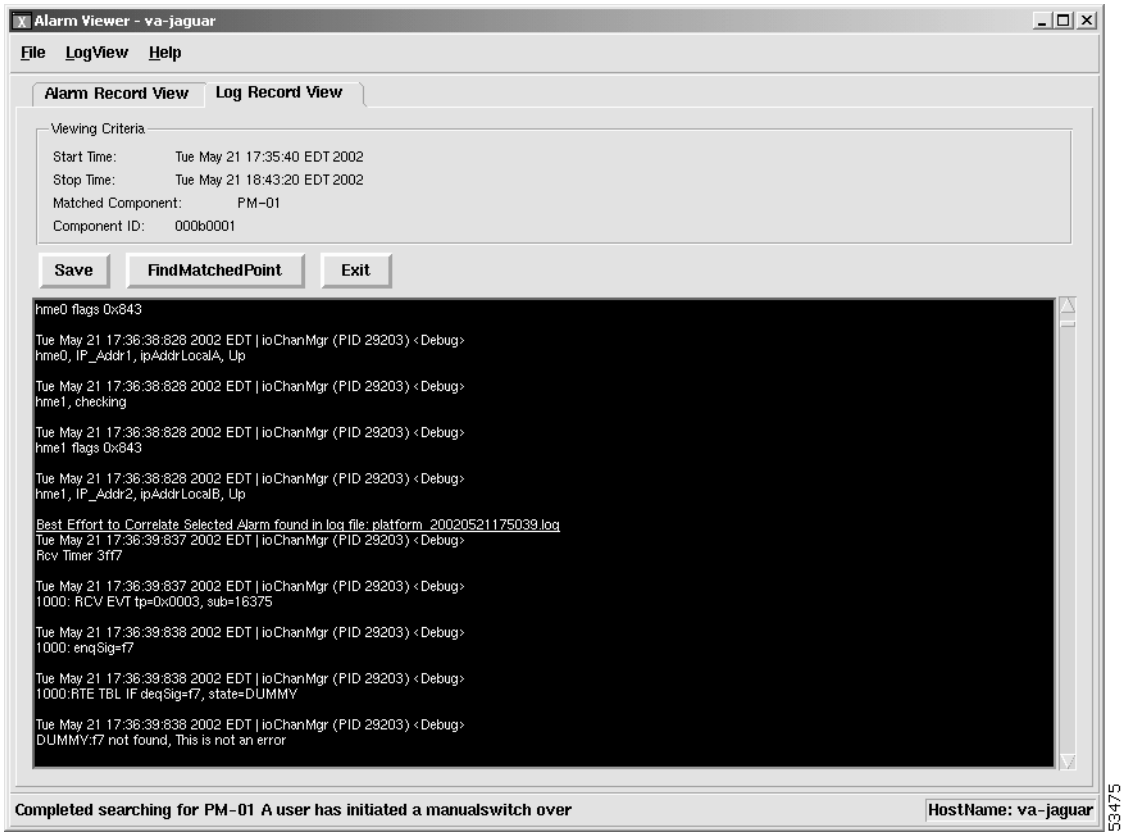
Step 8 To perform additional searches, repeat Step 2 to Step 6. The color of the text from the old search changes from multicolored to blue. The newly requested search data appears as multicolored text, after the old data. Scroll through the field to view the data you added. If you no longer require the previously requested data, you can clear the display field by clicking **Clear** before you click **Execute**. You can also reset the search criteria by clicking **Reset**.

Step 9 To save the displayed data, click **Save**. The contents of the field are saved to a file with the following directory path:

/opt/CiscoMGC/etc/cust_specific/toolkit/alarmRec.log

If you perform another search and save the content again, the contents of the field are added to the alarmRec.log file, after the previously saved data. To avoid adding the new search data to the previous data, change the name of the alarmRec.log file before you save the new data. To change the name of a file, see the procedures in the "Using the File Options Viewer" section on page 3-140.

Figure 3-3 Log Record View Tab Window


Alarm Viewer - va-jaguar
File
LogView
Help
Alarm Record View
Log Record View
Viewing Criteria
Start Time: Tue May 21 17:35:40 EDT 2002
Stop Time: Tue May 21 18:43:20 EDT 2002
Matched Component: PM-01
Component ID: 000b0001
Save
FindMatchedPoint
Exit
hme0 flags 0x843
Tue May 21 17:36:38:828 2002 EDT | ioChanMgr (PID 29203) <Debug>
hme0, IP_Addr1, ipAddrLocalA, Up
Tue May 21 17:36:38:828 2002 EDT | ioChanMgr (PID 29203) <Debug>
hme1, checking
Tue May 21 17:36:38:828 2002 EDT | ioChanMgr (PID 29203) <Debug>
hme1 flags 0x843
Tue May 21 17:36:38:828 2002 EDT | ioChanMgr (PID 29203) <Debug>
hme1, IP_Addr2, ipAddrLocalB, Up
Best Effort to Correlate Selected Alarm found in log file: platform_20020521175039.log
Tue May 21 17:36:39:837 2002 EDT | ioChanMgr (PID 29203) <Debug>
Rcv Timer 3ff7
Tue May 21 17:36:39:837 2002 EDT | ioChanMgr (PID 29203) <Debug>
1000: RCV EVT tp=0x0003, sub=16375
Tue May 21 17:36:39:838 2002 EDT | ioChanMgr (PID 29203) <Debug>
1000: enqSig=f7
Tue May 21 17:36:39:838 2002 EDT | ioChanMgr (PID 29203) <Debug>
1000:RTE TBL IF deqSig=f7, state=DUMMY
Tue May 21 17:36:39:838 2002 EDT | ioChanMgr (PID 29203) <Debug>
DUMMY:f7 not found, This is not an error
Completed searching for PM-01 A user has initiated a manualswitch over
HostName: va-jaguar
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Using the Call Detail Record Viewer

CDRs contain basic call billing information, such as date and time, duration, and the calling number and called number. The system writes CDRs into files that contain information about telephone activity. Also, the system saves CDR files in binary format.

Note For more information on CDRs, see *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*.

The CDR dumper (see Figure 1-2) provides logging capabilities on the Cisco PGW 2200 Softswitch for all CDRs. Also, the CDR dumper supports external user application programming interfaces (APIs). The APIs enable users to get a real-time feed of CDRs and call detail blocks (CDBs) from the Cisco PGW 2200 Softswitch. You can route the CDR and CDB data to a third-party mediation application for use in billing.

The CDR dumper operates according to the configuration set up in the XECfgParm.dat file. When certain thresholds are met, the CDR dumper closes and saves the generated CDB records in the $BASEDIR/var/spool directory.

The CDR viewer enables you to view and search CDRs that reside in the CDR logs. The formats of the CDBs and call data elements (CDEs) that comprise CDRs are specified in *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*. These records are designed for database loading, not for user reading. The CDR viewer can help you understand these records. The CDR viewer also provides useful searching functions that are based on the search criteria you select.

Note Your screen might be slightly different from this example, depending on the release of the software you are running.

You can exit the CDR viewer in one of two ways. In the **Query Criteria** portion of the window, click **Exit**, or from the **File** menu, select **Exit**.

Configuring the CDR Viewer

Whenever you start the CDR viewer, you must choose several configuration settings before you can view or search the CDR files. To view and search CDR files, complete the following steps:

Step 1 To open the CDR viewer, click **CDR Viewer** on the Cisco MGC toolbar. A popup window warns you that running this tool can affect system performance and asks if you want to launch the tool. Click **Yes** if you want to continue. The CDR Viewer window loads and displays.

Step 2 Click the **Configuration** tab. The Configuration tab window displays (Figure 3-4).

You cannot modify the first five fields in the window. These fields list the directory paths and filenames for the related data files.

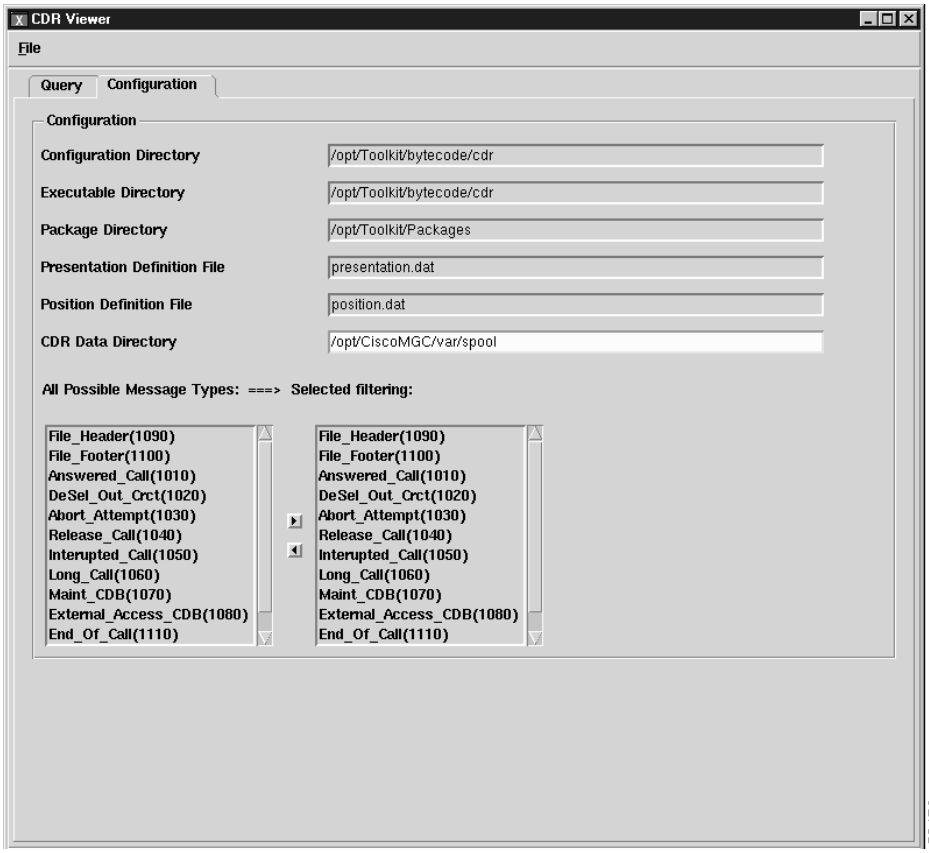
Step 3 To modify the CDR source directory on your local host, click in the CDR Data Directory field and change the displayed information.

Step 4 You can specify the message types to query. By default, the tool enables querying all message types.

To filter out certain message types, select these message types from the All Possible Message Types field and click the right arrow button. The CDR viewer displays the selected message types in the Selected filtering field.

To remove a message type from the Selected filtering field, select that message type and click the left arrow button.

Figure 3-4 Config Tab Window



Searching the CDR Files

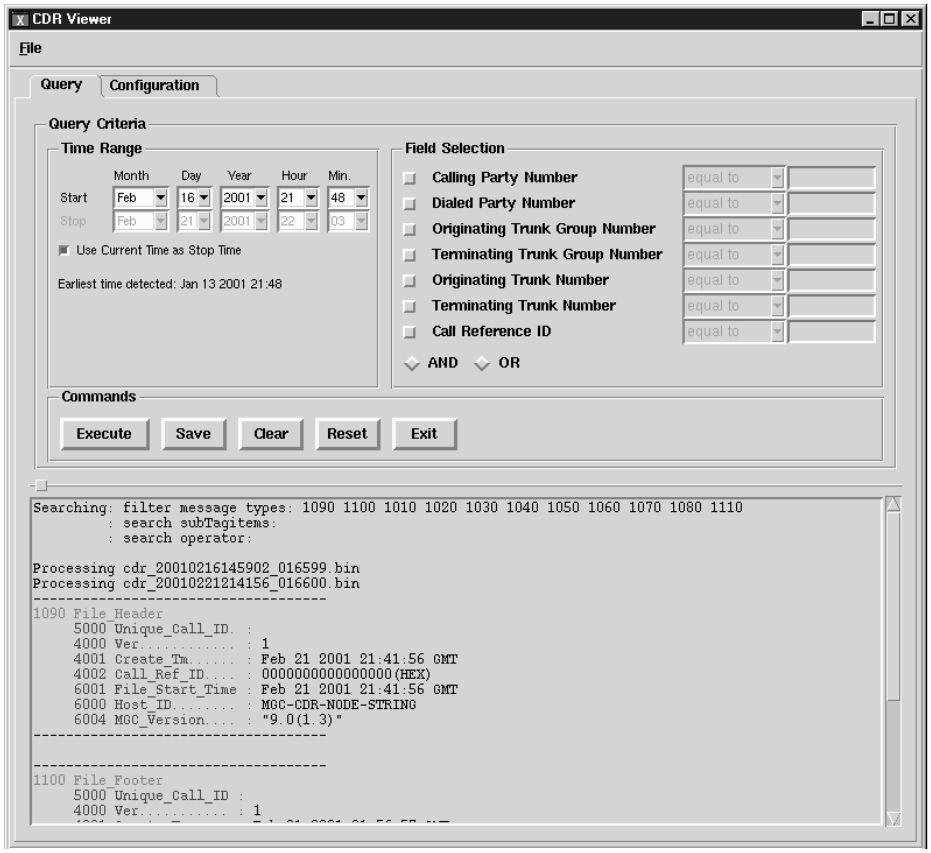
To search the various CDR files by component and category, complete the following steps:

Step 1 To open the CDR viewer, click **CDR Viewer** on the Cisco MGC toolbar. A popup window displays. The window warns you that running this tool can affect system performance and asks you if you want to launch the tool. Click **Yes** to continue. By default, the CDR Viewer window loads and displays the Query tab window (Figure 3-5).

If you opened the viewer, you must configure it before you can search the CDR files. See the "Configuring the CDR Viewer" section on page 3-124.

Step 2 You can search for alarms that occurred between dates and times, by specifying month, day, year, hour, and minute settings. To conduct a search, choose a starting date and time from the Start Date/Time drop-down list boxes. Then choose a stop date and time from the Stop Date/Time drop-down lists.

Figure 3-5 Query Tab Window



The current date and time are the default values for both the start and stop values for the time period; however, using these default values results in a null search (no records).

If you select the Use Current Time as Stop Time check box, you disable the Stop Date/Time drop-down lists and enable a search until the current date and time.

Step 3 To view your selected CDR files in their entirety, proceed to Step 7.

To search through your selected CDR files for particular types of CDRs, proceed to Step 4.

Step 4 You can search through your selected CDR files according to the following seven field values:

- Calling Party Number
- Dialed Party Number
- Originating Trunk Group Number
- Terminating Trunk Group Number
- Originating Trunk Number
- Terminating Trunk Number
- Call Reference ID

To select a field value, click the check box next to the name. You can select as many field values as you require.

Step 5 Enter a search qualifier and a related string for each field value that you select. Choose a search qualifier for the search string from the drop-down list box that is located to the right of the field value you select. The following list presents the search qualifiers:

- Equal to—The selected field in the CDB is equal to the value defined in the search string.
- Has—Any substring of the selected field in the CDB has the value that is defined in the search string.
- Begins with—The selected field in the CDB begins with the value defined in the search string.
- Ends with—The selected field in the CDB ends with the value defined in the search string.

Enter a search string in the field to the right of the search qualifier you chose.

Repeat this step for all field values that you select for your search.

Step 6 Choose a query operator (AND or OR) for your search. You can search for CDBs that have all of the field values you select (AND), or you can search for CDBs that have any of the field values you select (OR). The default value is AND. Click the appropriate check box to specify your query operator.

Step 7 Click **Execute** to search the files within the selected period. A popup window displays while the contents load. The contents display as multicolored text in the field at the bottom of the window.

Step 8 To perform additional searches, repeat Step 2 to Step 7. The color of the text from the old search changes from multicolored to black. The viewer inserts the newly requested search data as multicolored text after the old data. Scroll through the field to view the data you added. If you no longer require the previously requested data, clear the display field by clicking **Clear** before you click **Execute**. You can reset the search criteria by clicking **Reset**.

Step 9 To save the displayed data, click **Save**. The viewer saves the contents of the field to the file you specified in the Config tab window.

If you perform another search and save that content, the viewer adds the contents of the field to the same file, after the previously saved data. If you do not want to add the data to the previous data, you must change the name of the file before you save again. To change the name of a file, see the procedures in the "Using the File Options Viewer" section on page 3-140.

Using the Config-Lib Viewer

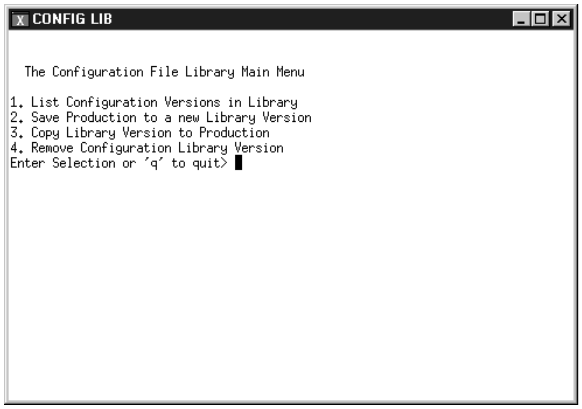
You can use the Config-Lib viewer (Figure 3-6) to manage the contents of the configuration library. The configuration library stores the various system configurations that you created while you provisioned the Cisco PGW 2200 Softswitch.

Click **CONFIG-LIB** on the Cisco MGC toolbar to open an xterm window and execute the config-lib script. To quit the Config-Lib viewer, enter **q** at the prompt.

The Config-Lib Viewer enables you to perform the following functions:

- List Configuration Versions in Library—Returns a list of the configuration versions that are stored in the library and identifies the configuration that is currently being used (referred to as the production version). To activate this function, enter 1 at the prompt.
- Save Production to a new Library Version—Saves your current configuration settings to a new version file. When you select this function, the Cisco PGW 2200 Softswitch software must not be running, or an error message is displayed. For more information on stopping the Cisco PGW 2200 Softswitch software, see the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4. To activate this function, enter 2 at the prompt and then enter the name for the new library version.

Figure 3-6 Config-Lib Viewer


CONFIG LIB
The Configuration File Library Main Menu
1. List Configuration Versions in Library
2. Save Production to a new Library Version
3. Copy Library Version to Production
4. Remove Configuration Library Version
Enter Selection or 'q' to quit>
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- Copy Library Version to Production—Restores your Cisco PGW 2200 Softswitch to the settings in an old configuration version. When you select this function, the Cisco PGW 2200 Softswitch software must not be running, or an error message is displayed. For more information on stopping the Cisco PGW 2200 Softswitch software, see the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4. To activate this function, enter **3** at the prompt and then enter the number of the library version to use as the production version.

Note Do not attempt to restore an old configuration version without the assistance of the Cisco TAC.

- Remove Configuration Library Version—Deletes a configuration version from the library. When you select this function, the Cisco PGW 2200 Softswitch software must not be running, or an error message is displayed. For more information on stopping the Cisco PGW 2200 Softswitch software, see the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4. To activate this function, enter 4 at the prompt and then enter the number of the library version to delete.

Using the Log Viewer

The log viewer enables you to search for, retrieve, and display log messages from the platform log files. For more information on platform log files see the "Recovering from a Switchover Failure" section on page 6-170. For a listing of the platform log messages, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

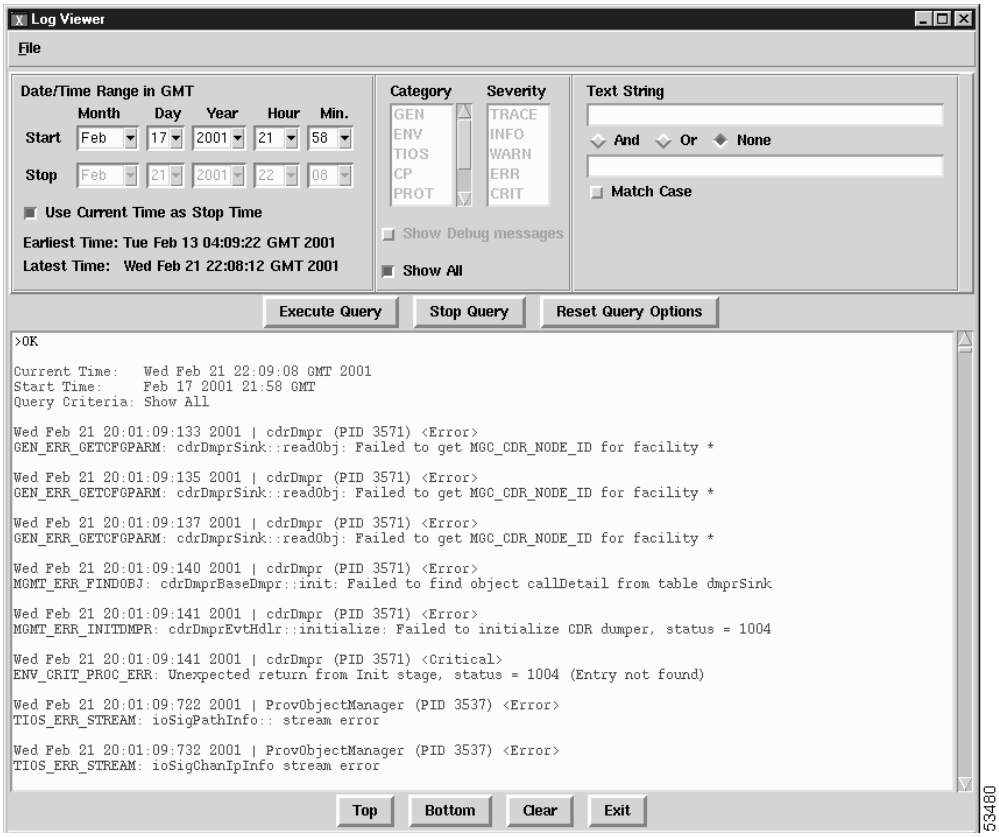
You can see a listing of the current log filenames by clicking the **File** menu and selecting the **Log List** option. Exit the log viewer in one of two ways: Click **Exit**, or from the **File** menu, select **Exit**.

Searching Log Record Files

Complete the following steps to search through various platform log files:

Step 1 To open the log viewer, click **Log Viewer** on the Cisco MGC toolbar. A popup window displays. The window warns you that running this tool can affect system performance and asks if you want to launch the tool. Click **Yes** to continue. The Log Viewer window loads and displays (see Figure 3-7).

Figure 3-7 Log Viewer


Log Viewer
File
Date/Time Range in GMT
Month Day Year Hour Min.
Start Feb 17 2001 21 58
Stop Feb 21 2001 22 08
Use Current Time as Stop Time
Earliest Time: Tue Feb 13 04:09:22 GMT 2001
Latest Time: Wed Feb 21 22:08:12 GMT 2001
Category
GEN
ENV
TIOS
CP
PROT
Severity
TRACE
INFO
WARN
ERR
CRIT
Show Debug messages
Show All
Text String
And Or None
Match Case
Execute Query
Stop Query
Reset Query Options
>OK
Current Time: Wed Feb 21 22:09:08 GMT 2001
Start Time: Feb 17 2001 21:58 GMT
Query Criteria: Show All
Wed Feb 21 20:01:09:133 2001 | cdrDmpr (PID 3571) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility *
Wed Feb 21 20:01:09:135 2001 | cdrDmpr (PID 3571) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility *
Wed Feb 21 20:01:09:137 2001 | cdrDmpr (PID 3571) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility *
Wed Feb 21 20:01:09:140 2001 | cdrDmpr (PID 3571) <Error>
MGMT_ERR_FINDOBJ: cdrDmprBaseDmpr::init: Failed to find object callDetail from table dmprSink
Wed Feb 21 20:01:09:141 2001 | cdrDmpr (PID 3571) <Error>
MGMT_ERR_INITDMPR: cdrDmprEvtHdlr::initialize: Failed to initialize CDR dumper, status = 1004
Wed Feb 21 20:01:09:141 2001 | cdrDmpr (PID 3571) <Critical>
ENV_CRIT_PROC_ERR: Unexpected return from Init stage, status = 1004 (Entry not found)
Wed Feb 21 20:01:09:722 2001 | ProvObjectManager (PID 3537) <Error>
TIOS_ERR_STREAM: ioSigPathInfo:: stream error
Wed Feb 21 20:01:09:732 2001 | ProvObjectManager (PID 3537) <Error>
TIOS_ERR_STREAM: ioSigChanIpInfo stream error
Top
Bottom
Clear
Exit
53480

Step 2 You can search for alarms that occurred between dates and times, by specifying month, day, year, hour, and minute settings. To conduct a search, choose a starting date and time from the Start Date/Time drop-down list boxes. Then choose a stop date and time from the Stop Date/Time drop-down lists.

The current date and time are the default values for both the start and stop values for the time period; however, using these default values results in a null search (no records).

If you select the Use Current Time as Stop Time check box, you disable the Stop Date/Time drop-down lists and enable a search until the current date and time.

Note You can clear the query options that you select at any time by clicking **Reset Query Options**.

Step 3 To view all of the logs within the time range you specified in Step 3, click the **Show All** check box. If you choose this option, your search can be based only on a text string. Go to Step 6 for more information on performing text searches.

If you do not want to view all of the logs within the time range you specified, proceed to Step 4 to further refine your search criteria before displaying the logs.

Step 4 To search for logs within certain log categories, select your desired category or categories by clicking one or more entries in the Category list box. To select multiple entries, hold down either the **Ctrl** or **Shift** key while clicking. The following list presents the available categories:

- GEN
- ENV

- TIOS
- CP
- PROT
- MGMT
- MML

Step 5 To search for logs of certain severities, select a severity or severities by clicking one or more entries in the Severity list box. To select multiple entries, hold down either the **Ctrl** or **Shift** key while clicking.

The severity choices are cumulative—each level that you select also displays all levels below it. For example, the ERR selection displays both ERR (error) and CRIT (critical) messages. The severity levels are:

- TRACE
- INFO
- WARN
- ERR
- CRIT

Step 6 Search for logs that contain certain text strings. You can search for up to two text strings. To conduct a search, enter the desired search strings in the Text String fields. The text is case-sensitive. The viewer allows all characters.

To search by only one text string, enter that string in the upper Text String field, and do not enter a string in the lower Text String field.

To search using two text strings, enter your strings in the upper and lower Text String fields.

To search for logs that contain both of your text strings, select the **And** check box. To search for logs that contain either of your text strings, check the **Or** check box.

If you want the text search to match the case that is used in your text strings, click the **Match Case** check box.

If you do not want to search for text strings, click the **None** check box.

Step 7 You can also choose to display debug messages. Debug messages do not conform to the log message format. If you choose this option, the debug messages are filtered only on the date, time, and text strings. To display debug messages, click the **Show Debug messages** check box. The viewer displays debug messages like the following:

```
platform.log … : currently active log

Fri Apr 14 17:57:19:253 2000 | ProcessManager (PID 24929) <Debug>
initialized process info for 'POM-01'

Fri Apr 14 17:57:25:908 2000 | ProcessManager (PID 24929) <Debug>
Received heartbeat response from process CFM-01
```

Caution Displaying debug messages can seriously affect system performance.

Step 8 Click **Execute Query** to display the results of your search. The results are displayed in the field at the bottom of the window, in increments of 5-MB blocks.

While the application is searching through the log files, a dialog box appears and shows the progression of the search. To stop a search in progress, click **Stop Query** in the dialog box.

Note Stopping the query can take several seconds.

Your results might include several pages of information. You can use several buttons to navigate through the results. To go to the end of the results, click **Bottom**. To go to the next page of results, click **More**. To go to the beginning of the results, click **Top**.

Step 9 To save the displayed data, choose the **File > Save**. A popup window lists the default save directory (/opt/CiscoMGC/etc/cust_specific/toolkit). Enter a filename for your data in the File Name field and click **Save**.

Step 10 To perform additional searches, repeat Step 2 to Step 9. The old search data is appended to the new search data. Clear the display field by clicking **Clear** before you click **Execute Query**.

Using the Measurement Viewer

The measurement viewer enables you to view and search records that reside in the measurement record logs. The formats of the various measurement records are specified in Appendix D, "Cisco PGW 2200 Softswitch Measurements."

The measurement viewer includes a help file, which contains information about the viewer. To access this information, choose **Help > ReadMe**. The help text displays. You can also see a list of the current measurement logs by choosing **File > Measurement List**. You can exit the measurement viewer in two ways. In the Query Criteria portion of the window, click **Exit**, or choose **File > Exit**.

Viewing and Searching System Measurement Files

Complete the following steps to view and search various system measurement files:

Step 1 To open the measurement viewer, click **Measurement Viewer** on the Cisco MGC toolbar. A popup window displays. The window warns you that running this tool can affect system performance and asks if you want to launch the tool. Click **Yes** to continue. The viewer displays the Measurement Viewer window (Figure 3-8).

Step 2 You can search for logs that occurred between certain dates and times, by specifying date, time, and counter interval settings. To set up a search, perform the following steps:

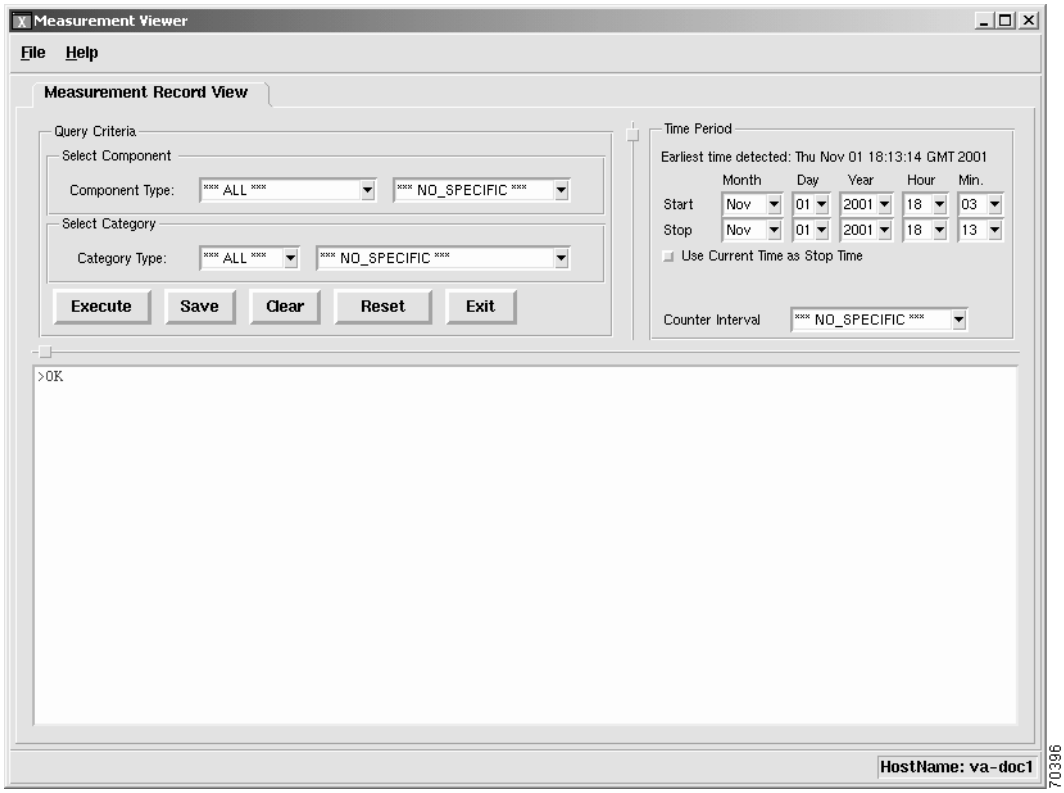
a. Choose a starting date and time from the Start Date/Time drop-down lists.

Note The current date and time are the default values for both the start and stop values for the time period; however, using these default values results in a null search (no records).

b. Choose a stop date and time from the Stop Date/Time drop-down lists.

Note If you select the Use Current Time as Stop Time check box, the viewer disables the Stop Date/Time drop-down list boxes and allows the search to continue to the current date and time.

Figure 3-8 Measurement Viewer Window



c. To refine your search further by specifying a counter interval, choose an interval from the Counter Interval drop-down list. The following intervals are valid for this field:

- NO_SPECIFIC (default value)
- 5_Minute
- 15_Minute
- 30_Minute
- 60_Minute
- 24_Hours

d. To refine your search further by specifying a system component type, proceed to Step 3.

To refine your search further by specifying a measurement category type, proceed to Step 4.

To execute a search that is based on your current search criteria, proceed to Step 5.

Step 3 To search by a system component, perform the following steps:

a. Choose a system component type from the Component Type drop-down list box. If you do not want to search by a system component or you want to view the entire contents of the files, choose the *ALL* entry in the Component Type list box.

Note When you choose a system component type, the drop-down list to the right of the Component Type list box fills with the names of the system components of that type that are configured on your system.

b. To refine your search further by specifying a particular system component, choose a system component name from the drop-down list box to the right of the Component Type list box.

Note The default value for this field instructs the viewer to search for all system components of the chosen component type.

c. To refine your search further by specifying a measurement category type, proceed to Step 4.

To execute a search that is based on your current search criteria, proceed to Step 5.

Step 4 To search by a measurement category, perform the following steps:

a. Choose a measurement category type from the Category Type drop-down list. If you do not want to search by a measurement category, or you want to view the entire contents of the files, choose the *ALL* entry in the Category Type list box.

Note When you choose a measurement category type, the drop-down list to the right of the Category Type list box fills with the names of all of the measurements that are associated with that type.

b. To refine your search further by specifying a particular measurement, choose a measurement from the drop-down list to the right of the Category Type list box.

Note The default value for this field instructs the viewer to search for all measurements of the chosen category.

Step 5 Click **Execute** to search the files within the chosen period. The viewer displays the results of the search as blue text in the field at the bottom of the window.

Step 6 To perform additional searches, repeat Step 2 to Step 5. The color of the text from the old search changes from blue to black. The viewer inserts the new search data in blue text, following the preceding data. Scroll through the field to view the data you added.

If you no longer require the previously requested data, you can clear the display field by clicking **Clear** before you click **Execute**. You can also reset the search criteria by clicking **Reset**.

Step 7 To save the displayed data, click **Save**. The viewer saves the contents of the field to a file with the following directory path:

/opt/CiscoMGC/etc/cust_specific/toolkit/measRec.log

If you perform another search and save the resulting contents, the viewer adds the contents of the field to the measRec.log file, after the previously saved data. If you do not want to add the new search data to the previous data, you must change the name of the measRec.log file before you save the new data. To change the name of a file, see the procedures in the "Using the File Options Viewer" section on page 3-130.

Using the Trace Viewer

You can use the trace viewer as part of performing a call trace. Click **Trace Viewer** in the Cisco MGC toolbar to open the Traces Files window. The Trace Files window lists the call trace files that you can choose (Figure 3-9). When you select a file, click **View** to open the Trace Viewer window (Figure 3-10). In the Trace Viewer window, you can select various call trace activities. For more information about call traces, see the "Performing a Call Trace" section on page 6-156.

Figure 3-9 Trace Viewer Window

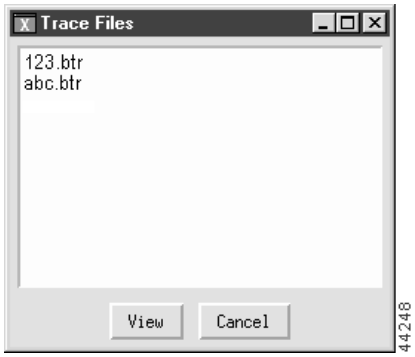
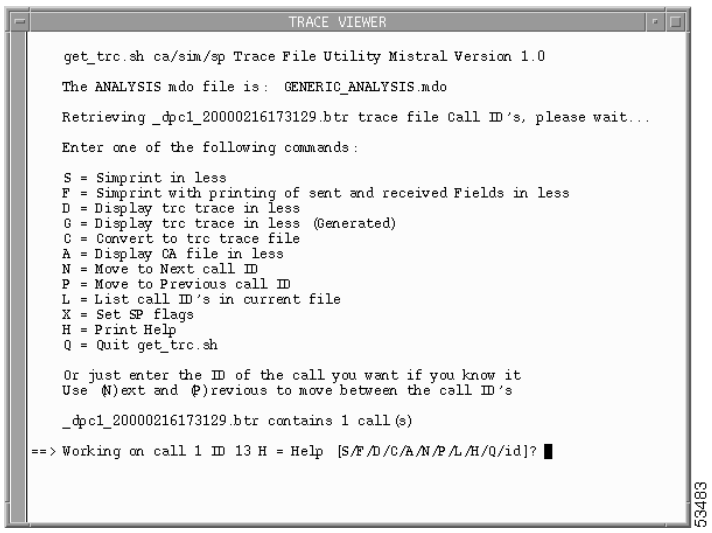


Figure 3-10 Trace Viewer Window


TRACE VIEWER
get_trc.sh ca/sim/sp Trace File Utility Mistral Version 1.0
The ANALYSIS mdo file is: GENERIC_ANALYSIS.mdo
Retrieving _dpc1_20000216173129.btr trace file Call ID's, please wait...
Enter one of the following commands:
S = Simprint in less
F = Simprint with printing of sent and received Fields in less
D = Display trc trace in less
G = Display trc trace in less (Generated)
C = Convert to trc trace file
A = Display CA file in less
N = Move to Next call ID
P = Move to Previous call ID
L = List call ID's in current file
X = Set SP flags
H = Print Help
Q = Quit get_trc.sh
Or just enter the ID of the call you want if you know it
Use (N)ext and (P)revious to move between the call ID's
_dpc1_20000216173129.btr contains 1 call(s)
==> Working on call 1 ID 13 H = Help [S/F/D/C/A/N/P/L/H/Q/id]?
53483

Using the Translation Verification Viewer

The translation verification viewer enables you to interface with the translation verification tool. The translation verification tool provides a way to understand how the Cisco PGW 2200 Softswitch processes calls based on the configured dial plan. This tool creates a simulation of the processing of a call. Use this tool on a system that is configured for call control.

Note The translation verification viewer does not simulate the screening database and cause analysis dial plan functions.

You can exit the translation verification viewer by choosing **File > Exit**.

Verifying a Dial Plan Translation

Complete the following steps to verify a dial plan translation:

Step 1 To open the translation verification viewer, click **Translation Verification** on the Cisco MGC toolbar. A popup window displays. The popup window warns you that running this tool can affect system performance and asks if you want to launch the tool. Click **Yes**. The Translation Verification Viewer window loads and displays the DialPlan Translation tab window by default (Figure 3-11).

Step 2 Enter the incoming trunk group number for your simulated call in the trunk group number field.

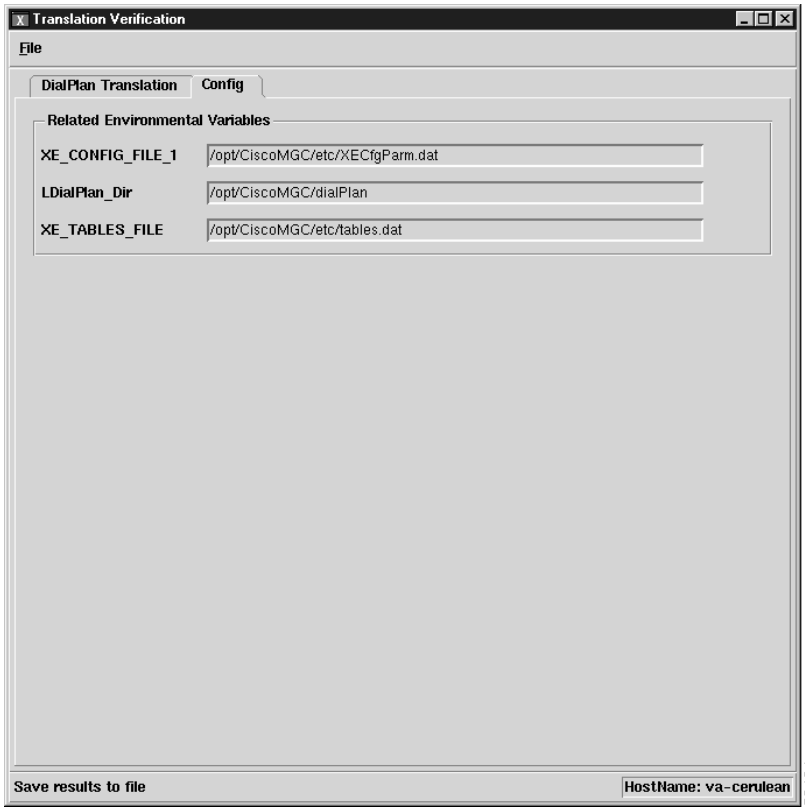
Step 3 Specify an ISDN preference for the selection of an outgoing trunk by choosing a value from the message-specific ISDN preference drop-down list. The following values are valid for this field:

- ISDN_NOT_REQUIRED (default value)
- ISDN_PREFERRED
- ISDN_REQUIRED

Step 4 Specify the Nature Of Address (NOA) setting for the called party by choosing a value from the called party Nature of Address drop-down list. The following values are valid for this list:

- NOA_NATIONAL (default value)
- NOA_NONE
- NOA_UNKNOWN
- NOA_SUBSCRIBER
- NOA_INTERNATIONAL
- NOA_NETWORK
- NOA_MERIDIAN
- NOA_ABBR
- NOA_UNIQUE_3DIG_NATL_NUM
- NOA_ANI
- NOA_NO_ANI_RECD
- NOA_NON_UNIQUE_SUBSCRIBER
- NOA_NON_UNIQUE_NATIONAL
- NOA_NON_UNIQUE_INTERNATIONAL
- NOA_OPRREQ_TREATED
- NOA_OPRREQ_SUBSCRIBER
- NOA_OPRREQ_NATIONAL
- NOA_OPRREQ_INTERNATIONAL
- NOA_OPRREQ_NO_NUM

Figure 3-11 DialPlan Translation Tab Window



- NOA_CARRIER_NO_NUM
- NOA_950_CALL
- NOA_TEST_LINE_CODE
- NOA_INT_INBOUND
- NOA_NAT_OR_INTL_CARRIER_ACC_CODE_INC
- NOA_CELL_GLOBAL_ID_GSM
- NOA_CELL_GLOBAL_ID_NMT_900
- NOA_CELL_GLOBAL_ID_NMT_450
- NOA_CELL_GLOBAL_ID_AUTONET
- NOA_PORTED_NUMBER
- NOA_PISN_SPECIFIC_NUMBER
- NOA_UK_SPECIFIC_ADDRESS
- NOA_SPARE
- NOA_SUBSCRIBER_OPERATOR_REQUESTED
- NOA_NATIONAL_OPERATOR_REQUESTED
- NOA_INTERNATIONAL_OPERATOR_REQUESTED
- NOA_NO_NUMBER_PRESENT_OPERATOR_REQUESTED
- NOA_NO_NUMBER_CUT_THROUGH_TO_CARRIER

- NOA_950_PUBLIC_HOTEL_LINE
- NOA_TEST_CALL
- NOA_MCI_VNET
- NOA_INTERNATIONAL_OPERATOR_TO_OPERATOR_OUTSIDE_WZI
- NOA_INTERNATIONAL_OPERATOR_TO_OPERATOR_INSIDE_WZI
- NOA_DIRECT_TERMINATION_OVERFLOW
- NOA_ISN_EXTENDED_INTERNATIONAL_TERMINATION
- NOA_TRANSFER_ISN_TO_ISN
- NOA_CREDIT_CARD
- RESERVED

Step 5 Specify the Numbering Plan Indicator (NPI) setting for the called party by choosing a value from the called party Numbering Plan Indicator drop-down list. The following values are valid for this field:

- NPI_E164 (default value)
- NPI_NONE
- NPI_DATA
- NPI_TELEX
- NPI_PNP
- NPI_NATIONAL
- NPI_TELEPHONY
- NPI_MARITIME_MOBILE
- NPI_LAND_MOBILE
- NPI_ISDN_MOBILE

Step 6 Specify the called number in the called numbers field.

Step 7 Specify the calling number in the calling numbers field.

Step 8 Specify the level of the trace by choosing a value from the trace level drop-down list. The following values are valid for this list:

- result (default)—Returns the originating trunk group number, called and calling party numbers, outgoing called and calling party numbers, and the resulting trunk group. This trace type is suited for quick call analysis.

  The result of the trace appears like the following example:

```
>simWriter -tgnum 7001 -isdnp 1 -cdnoa 4 -cdnpi 1 -cdpn 7075511234 -cgpn 7034843
368
>Result of Execution
Originating side: A-number     7034843368
                   B-number     7075511234
                   Trunk group  7001
Outgoing side:    A-number     7034843368
                   B-number     7075511234
                   No suitable trunk group found!
*Internal errors/warnings were encountered during translation!
>OK
```

- diagnostic—Returns limited information about all of the stages of number and route analysis and messages and warnings about data files being read and whether default values are being used. This trace type is suited for determining the results that the viewer used to produce the outgoing numbers and trunk group.

  The following is an example diagnostic trace:

```
>simWriter -tgnum 7001 -isdnp 1 -cdnoa 4 -cdnpi 1 -cdpn 7075511234 -cgpn 7034843
368 -diag
>Result of Execution

*********************************************************
* START call translation verification diagnostic summary *
*********************************************************

  performing Dial Plan Base.
  performing Profile Analysis (NOA).
*Internal errors/warnings were encountered during translation!

*********************************************************
*  END call translation verification diagnostic summary  *
*********************************************************
Analysing .dat files:
used default Route Prefernce
used default Terminating Max Digits
used default Terminating Min Digits
used default Originating Min Digits
used default Originating Max Digits
the Originating Start Index property for tg-7001 was not found in /opt/CiscoMGC/
etc/properties.dat
Customer Group ID's do not match up in the sigPath and Properties files
used default Carrier Screening property
used default AOCEnabled field
used the default field for default directory number
used the default Database Access Error flag
Analysis complete, writing message...
Message completed, running simulator...
>OK
```

- full—Returns complete information about all of the stages of number and route analysis. It also includes all tables and parameters from flat files and internal errors that are generated during generic analysis. This trace type is suited for determining where in the dial plan or number analysis problems occurred.

  The following is an example full trace:

```
>simWriter -tgnum 7001 -isdnp 1 -cdnoa 4 -cdnpi 1 -cdpn 7075511234 -cgpn 7034843
368 -full
>Result of Execution

*****************************************
* START full call translation verification *
*****************************************
Decoding generic analysis trace...
the length of the trace is 82 bytes
( 1)entering Dial Plan Base.
( 2) tracing Dial plan, entering Dial Plan Base table with...
( 1)   0 parameter(s):
( 2)   reading Dial Plan Base table...
( 1)     1 error/warning code read:
*Internal Error:Table could not be read
( 1)ending Dial Plan Base...
( 1)entering Call Information Reception.
(13) A Number:'7034843368'
```

```
(13) B Number:'7075511234'
( 1)ending Call Information Reception...
( 1)entering Profile Analysis (NOA).
(13) Tracing call number:'7075511234' (Called party number)
( 7) Trace for customer:'jst1'
( 5) TreeBase:'10'
( 2) tracing Dial plan, entering NOA table with...
( 1)   1 parameter(s):
( 4)     NOA table index = 4.
( 2)   reading NOA table...
( 1)     1 error/warning code read:
*Internal Error:Table could not be read
( 1)ending Profile Analysis (NOA)...
( 1)end of trace reached

*****************************************
* DONE full call translation verification *
* with  0 bytes left untranslated          *
*****************************************
Analysing .dat files:
used default Route Prefernce
used default Terminating Max Digits
used default Terminating Min Digits
used default Originating Min Digits
used default Originating Max Digits
the Originating Start Index property for tg-7001 was not found in /opt/CiscoMGC/
etc/properties.dat
Customer Group ID's do not match up in the sigPath and Properties files
used default Carrier Screening property
used default AOCEnabled field
used the default field for default directory number
used the default Database Access Error flag
Analysis complete, writing message...
Message completed, running simulator...
>OK
```

The content of the field identifies the elements of your dial plan that you need to modify, if necessary.

Step 9 Click **Execute** to perform a dial plan translation verification. The viewer displays results in the field at the bottom of the window.

Step 10 To verify additional dial plan translations, repeat Step 2 to Step 9. The newly requested data is inserted after the old data. Scroll through the field to view the data you added. If you no longer require the previously requested data, you can clear the display field by clicking **Clear** before you click **Execute**.

Step 11 To save the displayed data, click **SaveinFile**. The viewer saves the contents of the field to a file specified in the XECfgParms.dat file.

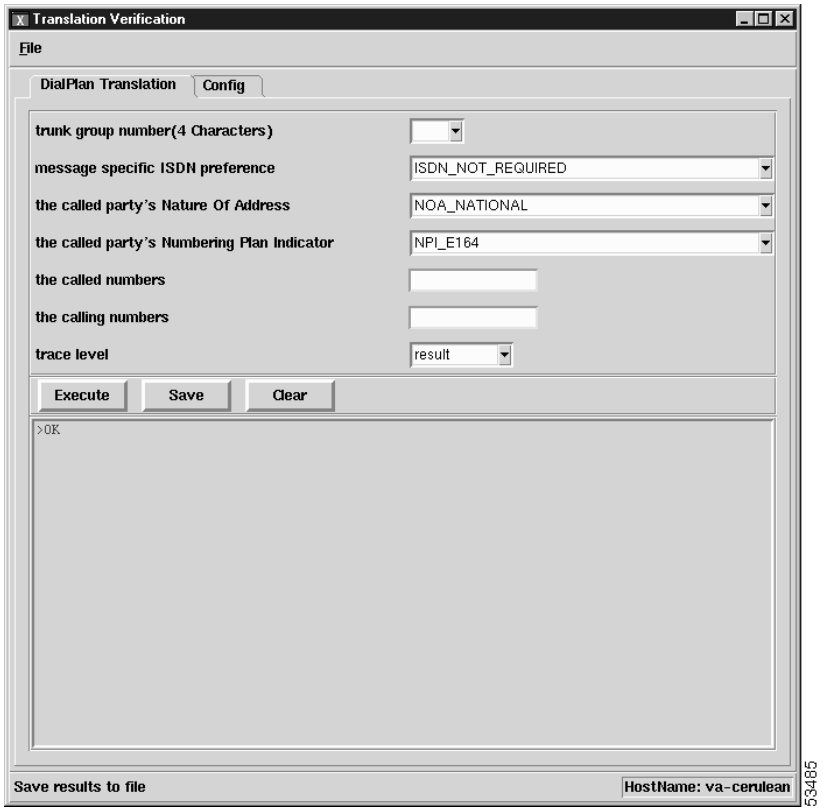
Viewing Dial Plan Translation Configuration Data

Complete the following steps to view the dial plan translation configuration data:

Step 1 To open the translation verification viewer, click **Translation Verification** on the Cisco MGC Toolbar. A popup window displays. The popup window warns that running this tool can affect system performance and asks if you want to launch the tool. Click **Yes**. The Translation Verification Viewer window loads and displays the DialPlan Translation tab window by default (Figure 3-11).

Step 2 Click the **Config** tab to display the Config tab window (Figure 3-12). The fields in this window reveal the directory paths to the files used by this viewer. You cannot modify the values in these fields.

Figure 3-12 Configuration Tab Window

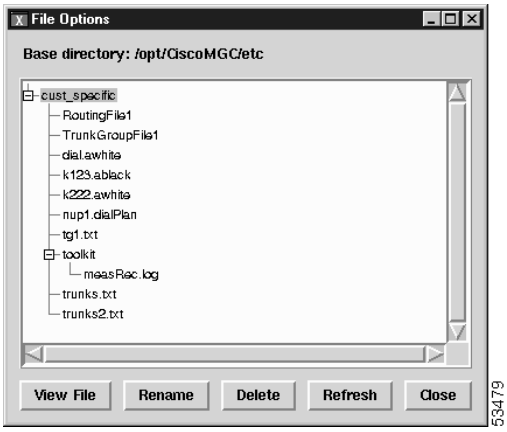


Using the File Options Viewer

The file options viewer (Figure 3-13) enables you to manage (rename, delete) the files within the $BASEDIR/etc/cust_specific directory. This directory contains all files that the various toolkit applications created. The MML export feature creates subdirectories, which contain configuration information in the form of MML commands.

Note You cannot use the file options viewer to delete files in the $BASEDIR/etc/cust_specific/export directory.

Figure 3-13 File Options Viewer Window

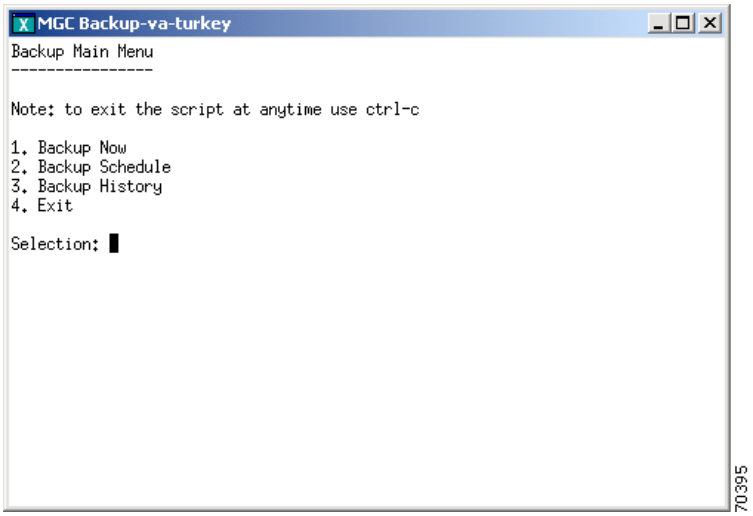


Using the MGC Backup Viewer

The MGC backup viewer enables you to back up the software configuration of the Cisco PGW 2200 Softswitch. For more information on using the MGC backup utility, see the "Backup Procedures for Cisco PGW 2200 Softswitch Software" section on page 3-30.

Figure 3-14 illustrates the main window for the MGC backup viewer.

Figure 3-14 MGC Backup Viewer Window

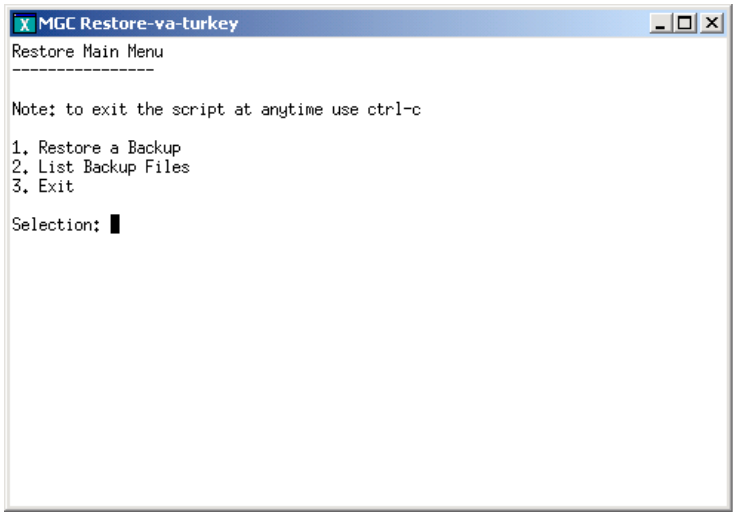


Using the MGC Restore Viewer

The MGC restore viewer enables you to restore a previously stored configuration to the Cisco PGW 2200. For more information on using the MGC restore utility, see the "Restoring Procedures for Cisco PGW 2200 Softswitch Software" section on page 6-177.

Figure 3-15 illustrates the main window for the MGC restore viewer.

Figure 3-15 MGC Restore Viewer Window



CHAPTER 4

Maintenance and Troubleshooting Overview

Revised: March 7, 2011, OL-0800-14

This chapter contains an overview of maintenance and troubleshooting concepts that you can apply to maintaining the elements of the Cisco PGW 2200 Softswitch platform. It includes overall maintenance and system troubleshooting strategies, and reviews available troubleshooting tools.

Although this chapter describes maintenance and troubleshooting separately, these activities are associated. Therefore, several of the maintenance and troubleshooting chapters in this guide frequently refer to each other.

This chapter includes the following sections:

- Maintenance Strategy Overview, page 4-1
- Troubleshooting Strategy Overview, page 4-2

Maintenance Strategy Overview

Maintenance usually consists of the following tasks for each element of the Cisco PGW 2200 Softswitch platform, performed in the order listed:

- Checking equipment status. Determining the status involves three basic activities:
  - Reading LEDs—Most Cisco products include LED indicators on the front or rear panels and, in some cases, on both panels. These LEDs indicate the status of the equipment. The specific meaning of each LED on each product is described in the maintenance sections for the individual elements of the Cisco PGW 2200 Softswitch platform.
  - Issuing Status Queries—Query the status of the system by entering various commands. The maintenance sections for the individual elements of the Cisco PGW 2200 Softswitch platform provide the commands that you can use to determine the status of the devices in your system.
  - Using a GUI NMS—Maintenance sections for the individual elements of the Cisco PGW 2200 Softswitch platform describe how to use a network management system (NMS) with a GUI, such as CiscoWorks2000, Cisco WAN Manager, and Cisco MGC Node Manager (CMNM), to determine the operational status of system devices.
- Removing a device from the system—Maintenance sections for the individual elements of the Cisco PGW 2200 Softswitch platform include procedures for removing defective devices from the system.
- Replacing the complete device—Maintenance sections for the individual elements of the Cisco PGW 2200 Softswitch platform describe how to reinstate a device into the system by using a new or repaired model.

- Replacing hardware components—Maintenance chapter for each element of the Cisco PGW 2200 Softswitch platform includes sections that describe how to replace the field-replaceable components of that device. You swap out components of a device to replace defective components and to upgrade hardware.

Troubleshooting Strategy Overview

The Cisco PGW 2200 Softswitch platform supports connections to external switches and to internal components, such as Media Gateway Controllers, signal processors, and trunking gateways. The Cisco PGW 2200 Softswitch platform functions in a complex environment, which involve numerous connections, links, and signaling protocols. When connectivity and performance problems occur, they can be difficult to resolve.

Troubleshooting usually consists of determining the nature of a problem and then isolating the problem to a particular device or component. When a problem is isolated and identified, troubleshooting also requires fixing the problem, usually by replacing the device or some component of the device. This chapter provides general troubleshooting strategies, as well as information about the tools available for isolating and resolving connectivity and performance problems.

Symptoms, Problems, and Solutions

System problems show certain symptoms. These symptoms can be general (such as a Cisco SS7 interface being unable to access the SS7 network) or specific (such as routes not appearing in a routing table).

Determine the cause of a symptom by using specific troubleshooting tools and techniques. After identifying the cause, correct the problem by implementing a solution that requires a series of actions.

General Problem-Solving Model

A systematic approach works best for troubleshooting. Define the specific symptoms. Identify all potential problems that could be causing the symptoms. Then systematically eliminate each potential problem (from the most likely to the least likely) until the symptoms are no longer present.

Figure 4-1 illustrates the process flow for this general approach to problem-solving. This process is not a rigid outline for troubleshooting. It is a guide that you can use to troubleshoot a problem successfully.

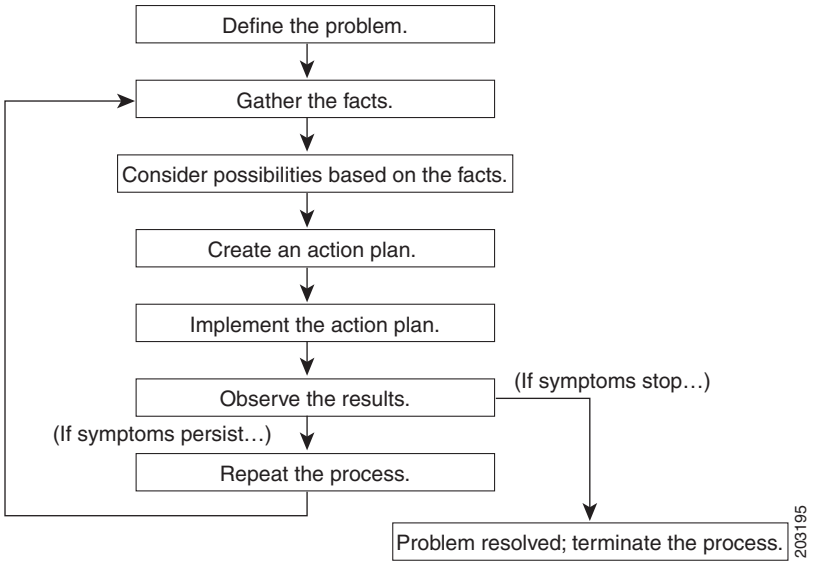
The following steps describe in more detail the problem-solving process that is outlined in Figure 4-1:

Note You need to determine and understand the message flow for certain actions. You might need to use different tools for situations in which messages are exchanged within the Cisco PGW 2200 Softswitch software or the operating system (UNIX), and situations in which messages flow between the Cisco PGW 2200 Softswitch and the external nodes over IP.

Step 1 When analyzing a problem, draft a clear problem statement. Define the problem in terms of a set of symptoms and the potential causes of those symptoms.

For example, the symptom might be that the EQPT FAIL alarm has become active. Possible causes might be physical problems, a bad interface card, or the failure of some supporting entity (for example, Layer 1 framing).

Figure 4-1 General Problem-Solving Model



Step 2 Gather the necessary facts to help isolate the symptoms and their possible causes.

Ask questions of affected users, network administrators, managers, and other key people. Collect information from sources such as network management systems, protocol analyzer traces, output from router diagnostic commands, or software release notes.

Step 3 Consider possible causes that are based on the facts you have gathered. You can use these facts to eliminate potential causes from your list.

For example, depending on the data, you might be able to eliminate hardware as a cause, which would allow you to focus on software. Try to reduce the number of potential causes so that you can create an efficient plan of action.

Step 4 Create an action plan that is based on the remaining potential causes. Begin with the most likely cause and devise a plan by which only one variable at a time is manipulated.

This approach allows you to reproduce the solution to a specific problem. If you alter more than one variable simultaneously, identifying the change that eliminates the symptom becomes more difficult.

Step 5 Perform each step of the action plan carefully, and test to see if the symptom disappears.

Step 6 Whenever you change a variable, gather the results. You should use the same method of gathering facts that you used in Step 2.

Analyze the results to determine if the problem is resolved. If it is, then the process is complete.

Step 7 If the problem is not resolved, you must create an action plan that is based on the next most likely problem in your list. Return to Step 2 and continue the process until the problem is solved.

Before trying out a new cure, be sure to undo any changes that you made when implementing your previous action plan. Remember to change only one variable at a time.

Note If you exhaust all of the common causes and actions (those causes that are outlined in this chapter and those causes that you have identified for your environment), your last recourse is to contact the Cisco Technical Assistance Center (TAC). See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information about contacting the Cisco TAC.

System Troubleshooting Tools

This section presents information about the tools you can use to troubleshoot the system.

Alarms

The Cisco PGW 2200 Softswitch software generates alarms that indicate problems with processes, routes, linksets, signaling links, and bearer channels. For more information on troubleshooting using alarms, see the "Alarm Troubleshooting Procedures" section on page 6-4. See *Cisco PGW 2200 Softswitch Release 9 Messages Reference* for detailed information on the system alarms.

Call Traces

The Cisco PGW 2200 Softswitch generates call traces that capture call-processing activity. With the call trace, you can follow the call from a specified destination through the Cisco PGW 2200 Softswitch software engine to see where it failed. Determine the location of a call failure by using the following information that is provided in the call trace:

- The protocol data units (PDUs) that the Cisco PGW 2200 Softswitch receives
- How the Cisco PGW 2200 Softswitch decodes the PDU
- The PDUs that the Cisco PGW 2200 Softswitch sends out

The results of call traces are signal flow diagrams that you can use for troubleshooting. Typically, call traces are used to capture system activity as part of a procedure to clear an alarm. For more information on using call traces, see the "Tracing" section on page 6-155.

System Logs

The Cisco PGW 2200 Softswitch software continuously generates log files of various system information, including operational measurements (OMs) and alarm records. You can use these logs to obtain statistical information about the calls that the system processes and network events such as delays or service-affecting conditions. The Cisco PGW 2200 Softswitch generates the following types of logs:

- Platform logs contain information that is useful for tracking configuration errors and signaling link and call instantiation problems.
- Command and response logs contain Man-machine language (MML) command history.
- Alarm logs contain alarm information.
- Measurement logs contain system measurements data.
- Call record logs contain call-processing data.

You can read system logs by using the viewers within the Cisco MGC viewer toolkit. For more information on the viewers that comprise the Cisco MGC toolkit, see the "Using the Cisco MGC Viewer Toolkit" section on page 3-119.

See the Appendix A, "Configuring Cisco PGW 2200 Softswitch Log Files," for more information on system log files.

MML Queries

MML is the command line interface method for configuring and managing the Cisco PGW 2200 Softswitch. You can enter MML commands to retrieve information about system components, and to perform logging and tracing. See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for more information.

Cisco Internetwork Management Tools

The following Cisco internetwork management products provide design, monitoring, and troubleshooting tools to help you manage the Cisco PGW 2200 Softswitch platform:

- CiscoWorks2000
- Cisco WAN Manager
- Cisco MGC Node Manager (CMNM)

CiscoWorks2000

CiscoWorks2000 is a series of SNMP-based internetwork management software applications. CiscoWorks applications are integrated on several popular network management platforms. The applications build on industry-standard platforms to provide tools for monitoring device status, maintaining configurations, and troubleshooting problems.

The following list names applications that are included in CiscoWorks2000. These applications are useful for troubleshooting:

- Device Monitor—Monitors specific devices for environmental and interface information.
- Health Monitor—Displays information about the status of a device, including buffers, CPU load, memory available, and protocols and interfaces being used.
- Show Commands—Enable you to view data that are like the data that are generated by router show EXEC commands.
- Path Tool—Collects path utilization and error data by displaying and analyzing the path between devices.
- Device Polling—Extracts data about the condition of network devices.
- CiscoView—Provides dynamic monitoring and troubleshooting functions, including a graphical display of Cisco devices, statistics, and comprehensive configuration information.
- Offline Network Analysis—Collects historical network data for offline analysis of performance trends and traffic patterns.
- CiscoConnect—Enables you to provide Cisco with debugging information, configurations, and topology information to speed resolution of network problems.

Use CiscoWorks2000 to manage several Cisco products. For example, you can use CiscoWorks2000 on the Cisco PGW 2200 Softswitch platform to manage Cisco SS7 interfaces and other Cisco switches. See the CiscoWorks2000 documentation for more information.

Cisco WAN Manager

Cisco WAN Manager is part of the Cisco Service Management System. Cisco WAN Manager includes tools that operators of service provider networks and large enterprise networks can use to provision and manage their networks. The Cisco WAN Manager provides fault-management features and can be used along with other applications such as CiscoView, the Event Browser, and Configuration Save and Restore.

Use Cisco WAN Manager to perform search, sort, and filter operations, and to tie events to extensible actions. For instance, Cisco WAN Manager can page someone upon receiving a certain type of SNMP trap. It supports alarm hierarchies that report the root cause of problems to operators and higher-level systems.

Configuration Save and Restore saves a snapshot of the entire network configuration. For disaster recovery, operators can selectively restore configurations of any element, from a single node up to the entire network. This restoration ability significantly reduces recovery time when a catastrophic failure occurs.

The Cisco WAN Manager Trivial File Transfer Protocol (TFTP) statistics collection facility offers the ability to obtain extensive usage and error data across machines and platforms.

A wide range of statistics is available at the port and virtual channel level including the following:

- Connection statistics
- Circuit line statistics
- Packet line statistics
- Frame Relay port statistics
- Network statistics
- Physical layer statistics
- Protocol layer statistics

Use the Cisco WAN Manager application to manage several Cisco products. Use the Cisco WAN Manager on the Cisco PGW 2200 Softswitch platform to manage Cisco SS7 interfaces and other switches. See the Cisco WAN Manager documentation for more information.

Cisco MGC Node Manager

The Cisco MGC Node Manager (CMNM) is an element management system that is based on the Cisco Element Management Framework (CEMF). It is responsible for managing the Cisco PGW 2200 Softswitch platform, including the Cisco PGW 2200 Softswitch, other switches, and Cisco SS7 interfaces.

NMS design divides network management into five discrete areas: Fault, Configuration, Accounting, Performance, and Security. The Cisco MNM provides fault and performance management of the Cisco PGW 2200 Softswitch, as well as flow-through provisioning of the Cisco PGW 2200 Softswitch and its subcomponents. In addition, MNM provides fault and performance management of the Cisco SS7 interfaces and switches. MNM uses the Cisco Voice Services Provisioning Tool (VSPT) to enable configuration of the Cisco PGW 2200 Softswitch and uses CiscoView to configure the Cisco SS7 interfaces and switches.

The CEMF platform provides security and some accounting features. MNM does not provide any security or accounting features beyond the features that the CEMF provides. MNM operates separately with a customer-operations support system or a Cisco NMS such as the Voice Network Manager (VNM).

For more information on MNM, see *Cisco Media Gateway Controller Node Manager User Guide*.

Cisco SS7 Interface Diagnostic Commands

Cisco SS7 interfaces provide the following integrated Cisco IOS command types to assist you in monitoring and troubleshooting systems:

- **show**
- **debug**
- **ping**
- **trace**

Show Commands

The **show** commands are powerful monitoring and troubleshooting tools. You can use the **show** commands to perform several functions:

- Monitor router behavior during initial installation
- Monitor normal network operation
- Isolate problem interfaces, nodes, media, or applications
- Determine when a network is congested
- Determine the status of servers, clients, or other neighbors

Some of the most commonly used status commands include the following:

- **show interfaces**—Displays statistics for network interfaces using the following commands:
  - **show interfaces ethernet**
  - **show interfaces fddi**
  - **show interfaces atm**
  - **show interfaces serial**
- **show controller t1**—Displays statistics for T1 interface card controllers
- **show running-config**—Displays the router configuration currently running
- **show startup-config**—Displays the router configuration that is stored in nonvolatile RAM (NVRAM)
- **show flash**—Displays the layout and contents of flash memory
- **show buffers**—Displays statistics for the buffer pools on the router
- **show memory**—Shows statistics about the router memory, including free pool statistics
- **show processes**—Displays information about the active processes on the router
- **show stacks**—Displays information about the stack utilization of processes and interrupt routines, as well as the reason for the last system reboot
- **show version**—Displays the configuration of the system hardware, the software version, the names and sources of configuration files, and the boot images

For details on using and interpreting the output of specific **show** commands, see the Cisco IOS command reference for the release currently used.

Using Debug Commands

The **debug** commands in privileged EXEC mode can provide information about the traffic being seen (or not seen) on an interface. This information includes error messages that network nodes generate, protocol-specific diagnostic packets, and other useful troubleshooting data.

Caution Be careful when using **debug** commands. These commands are processor-intensive and can cause serious network problems (degraded performance or loss of connectivity) if they are enabled on an already heavily loaded router. When you finish using a **debug** command, remember to disable it with its specific **no debug** command, or use the **no debug all** command to turn off all debugging.

Note Output formats vary among **debug** commands. Some commands generate a single line of output per packet. Other commands generate multiple lines of output per packet. Some commands generate large amounts of output; other commands generate only occasional output. Some commands generate lines of text; other commands generate information in field format.

To minimize the negative impact of using **debug** commands, follow this procedure:

Step 1 Enter the **no logging console** global configuration command on your router. This command disables all logging to the console terminal.

Step 2 Establish a Telnet session to a router port and enter the **enable** EXEC command.

Step 3 Enter the **terminal monitor** command on your router to copy **debug** command output and system error messages to your current terminal display.

This procedure permits you to view **debug** command output remotely, without being connected through the console port. Following this procedure minimizes the load that is created by using **debug** commands because the console port no longer has to generate character-by-character processor interrupts.

If you intend to keep the output of the **debug** command, spool the output to a file. *Cisco IOS Debug Command Reference* provides the procedure for setting up such a **debug** output file, and complete details about the function and output of **debug** commands.

Note In many situations, third-party diagnostic tools can be more useful and less intrusive than the **debug** commands. For more information, see the "Third-Party Troubleshooting Tools" section on page 4-9.

Using the Ping Command

To check host accessibility and network connectivity, use the **ping** command in EXEC (user) or privileged EXEC mode.

For IP, the **ping** command sends ICMP Echo messages. If a station receives an ICMP Echo message, it sends an ICMP Echo Reply message back to the source. The extended command mode of the **ping** command permits you to specify the supported IP header options. This command enables the router to perform a more extensive range of test options.

We suggests using the **ping** command when the network is functioning properly under normal conditions. You can compare the information that the command returns when the network is performing as expected with the information returned by the command when you are troubleshooting a problem.

For detailed information on using the **ping** command and extended **ping** commands, see the *Cisco IOS Configuration Fundamentals Command Reference*.

Using the Trace Command

The **trace user** command in EXEC mode discovers the routes that packets follow when traveling to their destinations. The **trace** command in privileged EXEC mode enables you to specify the supported IP Header options, which enable the router to perform a more extensive range of test options. The **trace** command uses the error message that a router generates when a datagram exceeds its time-to-live (TTL) value. First probe datagrams are sent with a TTL value of 1, which causes the first router to discard the probe datagrams and send back "time exceeded" error messages. The **trace** command then sends several probes and displays the round-trip time for each. After every third probe, the TTL increases by 1.

Each outgoing packet can result in one of two error messages. A "time exceeded" error message indicates that an intermediate router has seen and discarded the probe. A "port unreachable" error message indicates that the destination node has received the probe and discarded it, because it could not deliver the packet to an application. If the timer goes off before a response comes in, the **trace** command prints an asterisk (*).

The **trace** command terminates when the destination responds, when the maximum TTL is exceeded, or when the user interrupts the **trace** with the escape sequence.

It is a good idea to use the **trace** command when the network is functioning properly under normal conditions. Compare the information that the command returns when the network is performing as expected with the information returned by the command when you are troubleshooting a problem.

For detailed information on using the **trace** and extended **trace** commands, see *Cisco IOS Configuration Fundamentals Command Reference*.

Third-Party Troubleshooting Tools

In many situations, third-party diagnostic tools can be more useful than system commands that are integrated into the router. For example, issuing a processor-intensive **debug** command can contribute to the overloading of an environment that is already experiencing excessively high traffic levels. Attaching a network analyzer to the suspect network is less intrusive and is more likely to yield useful information without interrupting the operation of the router.

Some useful third-party tools for troubleshooting internetworks include the following:

- Volt-ohm meters, digital multimeters, and cable testers
- Breakout boxes, fox boxes, bit error rate testers (BERTs), and block error rate testers (BLERTs)
- Network analyzers and network monitors
- Time domain reflectometers (TDRs) and optical time domain reflectometers (ODTRs)

Volt-Ohm Meters, Digital Multimeters, and Cable Testers

Volt-ohm meters and digital multimeters are at the lower end of the spectrum of cable testing tools. These devices can measure basic parameters such as alternating current (AC) and direct current (DC) voltage, current, resistance, capacitance, and cable continuity. They are used primarily to check physical connectivity.

Cable testers (scanners) can also be used to check physical connectivity. Cable testers are available for shielded twisted-pair, unshielded twisted-pair, 10BASE-T, and coaxial and twinax cables.

A cable tester might also be able to perform any of the following functions:

- Test and report on cable conditions, including near-end crosstalk, attenuation, and noise
- Perform TDR, traffic monitoring, and wire map functions
- Display Media Access Control (MAC) layer information about network traffic, provide statistics such as network utilization and packet error rates, and perform limited protocol testing (for example, TCP/IP tests such as ping)

Similar testing equipment is available for fiber-optic cable. Because of the relatively high cost of fiber-optic cable and its installation, the cable should be tested both before installation (on-the-reel testing) and after installation. Continuity testing of fiber-optic cable requires either a visible light source or a reflectometer. You can use a power meter with a light source that is capable of providing light at the three predominant wavelengths, 850 nanometers (nm), 1300 nm, and 1550 nm. A power meter can measure the same wavelengths and test attenuation and return loss in the fiber-optic cable.

Breakout Boxes, Fox Boxes, and BERTs/BLERTs

Breakout boxes, fox boxes, and *BERTs/BLERTs* are digital interface testing tools that are used to measure the digital signals present at the interfaces of PCs, CSU/DSUs, and other devices. These testing tools can monitor data line conditions, analyze and trap data, and diagnose problems common to communications systems. Examine traffic from data terminal equipment (DTE) through data communications equipment (DCE) to isolate problems, identify bit patterns, and ensure that the proper cabling has been installed. These devices cannot test media signals such as those for Ethernet, Token Ring, or FDDI.

Network Monitors and Analyzers

Use network monitors to track packets that are continuously crossing a network. A *network monitor* enables you to obtain an accurate picture of network activity at any moment, or a historical record of network activity during a period. Network monitors do not decode the contents of frames. Monitors are useful for baselining, in which the activity on a network is sampled during a period to establish a normal performance profile or baseline.

Monitors collect information such as packet sizes, numbers of packets, error packets, overall usage of a connection, and the number of hosts and their MAC addresses. A monitor also provides details about communications between hosts and other devices. You can use the data to create profiles of network traffic, locate traffic overloads, plan for network expansion, detect intruders, establish baseline performance, and distribute traffic more efficiently.

A *network analyzer* (also called a *protocol analyzer*) decodes the various protocol layers in a recorded frame and presents them as readable abbreviations or summaries. The analyzer provides details about which network layer is involved (physical, data link, and so on) and what function each byte or byte content serves.

Most network analyzers can perform many of the following functions:

- Filtering traffic that meets certain criteria so that, for example, all traffic to and from a particular device can be captured
- Time-stamping captured data
- Presenting protocol layers in an easily readable form
- Generating frames and transmitting them onto the network
- Incorporating an “expert” system in which the analyzer uses a set of rules, combined with information about the network configuration and operation, to diagnose and solve network problems

TDRs and OTDRs

TDRs are at the top end of the cable testing spectrum. These devices can quickly locate open and short circuits, crimps, kinks, sharp bends, impedance mismatches, and other defects in metallic cables.

A TDR works by “bouncing” a signal off the end of the cable. Opens, shorts, and other problems reflect the signal back at different amplitudes, depending on the problem. A TDR measures how much time it takes for the signal to reflect and calculates the distance to a fault in the cable. Also, TDRs can measure the length of a cable or calculate the propagation rate that is based on a configured cable length.

An OTDR performs fiber-optic measurement. OTDRs can measure accurately the length of the fiber, locate cable breaks, measure the fiber attenuation, and measure splice or connector losses. An OTDR can ascertain the “signature” of a particular installation, noting attenuation and splice losses. When you suspect a problem in the system, you can compare the baseline measurement with future signatures.

CHAPTER 5

Maintaining the Cisco PGW 2200 Softswitch

Revised: March 7, 2011, OL-0800-14

This chapter contains the recommended hardware maintenance procedures for the Cisco PGW 2200 Softswitch. The Cisco PGW 2200 Softswitch performs call-processing, trunk resource management, alarm management, and routing. The Cisco PGW 2200 Softswitch also provides various Cisco telephony solutions with Advanced Intelligent Network (AIN) capabilities. AIN capabilities include the ability to detect conditions that cause the Cisco PGW 2200 Softswitch to query service logic for further call-processing instructions. You can install the Cisco PGW 2200 Softswitch in simplex or continuous service configurations. In simplex configurations, only one Cisco PGW 2200 Softswitch is equipped. In continuous service configurations, two Cisco PGW 2200 Softswitches are equipped. Only one Cisco PGW 2200 Softswitch is active at a time in a continuous service configuration, while the other Cisco PGW 2200 Softswitch operates in standby mode. The Cisco PGW 2200 Softswitch runs on various Sun Netra UNIX systems.

This chapter briefly describes hardware maintenance for the Cisco PGW 2200 Softswitch. For more detailed information, see the documentation that Sun Microsystems provides for your hardware platform. For information on upgrading and maintaining Cisco PGW 2200 Softswitch software, see the *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

This chapter includes the following sections:

- Checking Equipment Status, page 5-1
- Maintaining Technical Support Staff, page 5-2
- Maintaining Components, page 5-3

Checking Equipment Status

You can determine the status of the Cisco PGW 2200 Softswitch by using the following methods:

- Reading the Cisco PGW 2200 Softswitch LEDs
- Querying the system using UNIX and Man-Machine Language MML commands.

The UNIX and MML commands for querying the status of the system are found in Chapter 3, "Cisco PGW 2200 Softswitch Platform Operations." Information about the LEDs on the Cisco PGW 2200 Softswitch is in the following sections.

LEDs

See Sun documentation for the specific Cisco PGW 2200 Softswitch hardware platform you are using.

Sun Netra T 1120/1400 and Sun Netra T 1125/1405

The Sun Netra T 1120/1400 and Sun Netra T 1125/1405 have the following LEDs:

- POWER—Green LED is illuminated at all times when the system is on.
- SYSTEM—Green LED is off during power-up procedures and is illuminated when UNIX is running and the alarms driver is installed. A hardware watchdog timeout can reset this LED. Also, an asserted user-defined Alarm 3 (spare) can reset this LED.
- ALARM1—Amber LED is illuminated when the user-defined Alarm 1 is asserted.
- ALARM2—Amber LED is illuminated when the user-defined Alarm 2 is asserted.
- SPARE—Amber LED is reserved for future use.

The DC-powered Sun Netra T 1120/1400 displays the following additional LEDs:

- SUPPLY A—Green LED is illuminated when DC input A is present and the system is powered on.
- SUPPLY B—Green LED is illuminated when DC input B is present and the system is powered on.

Sun Netra X4270

See the *Sun Netra™ X4270 Server Service Manual* from the Oracle website at:

http://download.oracle.com/docs/cd/E19591-01/index.html

Sun Fire X4640

See the *Sun Fire™ X4640 Server Service Manual* from the Oracle website at:

http://download.oracle.com/docs/cd/E19273-01/821-0243/index.html

Maintaining Technical Support Staff

Skill Level of Personnel

The engineering staff must be trained to support the Sun Netra product in the field. To be certified by Sun, support personnel must successfully complete the Sun certification training courses and pass the Solaris administrator certification examinations.

All engineers must be able to perform the following tasks:

- User assistance
- Problem diagnosis and duplication
- Hardware replacement
- Patch distribution

The technical profile portion of the Sun audit analyzes the technical ability of service personnel and determines if the support staff is sufficient for quality customer support.

Staff Software Troubleshooting Tools

The support engineers must have a current version of Sunsolve to assist in troubleshooting and resolving problems.

Maintaining Components

For more detailed information, see
Cisco PGW 2200 Softswitch Hardware Installation Guide (Release 7 & 9).

Software Upgrades

See *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide* for a description of the procedures for software upgrades.

CHAPTER 6

Troubleshooting the Cisco PGW 2200 Softswitch Platform

Revised: March 7, 2011, OL-0800-14

This chapter describes troubleshooting methods for the Cisco PGW 2200 Softswitch platform. The following sections include instructions to help you isolate system problems:

- Troubleshooting Overview, page 6-1
- Troubleshooting Using Cisco PGW 2200 Softswitch Alarms, page 6-3
- Troubleshooting with System Logs, page 6-89
- Resolving SS7 Network Related Problems, page 6-94
- Resolving Bearer Channel Connection Problems, page 6-123
- Resolving SIP Communication Problems, page 6-155
- Tracing, page 6-155
- Platform Troubleshooting, page 6-169

Troubleshooting Overview

This chapter presents the alarms and logs that the Cisco PGW 2200 Softswitch generates. Information provided by the alarms and log files help to isolate problems with the system. For complete lists of alarms and logs, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

Several of the corrective actions in this chapter point to other chapters in this manual. This chapter also refers to troubleshooting tools including the Cisco PGW 2200 Softswitch software, the Cisco WAN Manager, the Cisco Media Gateway Controller Node Manager (CMNM), and CiscoWorks.

The chapter describes ways to troubleshoot typical problems. The examples provide a logical sequence for troubleshooting that you can use as a model.

Note To troubleshoot problems with the Cisco PGW 2200 Softswitch platform, users must have some experience administering the system, and must understand UNIX at the system administrator level.

The following sections present solutions to various equipment failure scenarios:

- Cisco ITP-L Failure
- Cisco PGW 2200 Softswitch Failure
- Operating System Failure

Cisco ITP-L Failure

Each Cisco IP Transfer Point LinkExtender (ITP-L) has a Reliable User Datagram Protocol (RUDP)/User Datagram Protocol (UDP)/IP connection to each Cisco PGW 2200 Softswitch for the transfer of Message Transfer Part (MTP) Level 3 (MTP3), ISDN User Part (ISUP), and Transaction Capabilities Application Part (TCAP) information. A Cisco ITP-L platform failure causes the surviving Cisco ITP-L platforms to take over the distribution of messages to the active Cisco PGW 2200 Softswitch. You should provision Cisco ITP-L platforms so that half of the platforms can support the entire signaling load. A single Cisco ITP-L platform failure should not have a significant effect on call processing.

There are several Cisco ITP-L failure scenarios to consider:

- IP link failure between the Cisco ITP-L and the Cisco PGW 2200 Softswitch, which indicates that it is impossible to transfer MTP3 messages. In this case, MTP Level 2 (MTP2) transmits Status Indication Processor Outage (SIPO) messages to the signaling transfer point (STP) to begin switchover to another Cisco ITP-L.
- If MTP2 failed (equivalent to a Cisco ITP-L failure), no SIPO messages are sent because MTP2 is inoperable. Instead, the mated STP pair detects the failure because of timer expiration or link unavailability and starts the switchover to another SS7 link.
- If a Cisco ITP-L timer detects a Cisco PGW 2200 Softswitch fault, a coordination mechanism causes SS7 messaging to flow to the newly active (formerly standby) Cisco PGW 2200 Softswitch. The standby Cisco PGW 2200 Softswitch assumes control for all calls in progress and all new calls.

Cisco PGW 2200 Softswitch Failure

Cisco PGW 2200 Softswitches run in active-standby mode. The call-processing application is active on only one Cisco PGW 2200 Softswitch at a time, and the application switches to the standby platform when a critical alarm occurs. Consequently, a Cisco PGW 2200 Softswitch failure and switchover events are invisible to the SS7 signaling network.

Cisco PGW 2200 Softswitch alarms can be minor, major, or critical. Critical alarms are generated whenever any significant failure occurs. Any critical alarm causes a switchover to occur. For example, if the call engine or I/O channel controller (IOCC)-MTP in the active Cisco PGW 2200 Softswitch fails, there is a disconnection from the process manager and a switchover to the standby Cisco PGW 2200 Softswitch.

Operating System Failure

An operating system or hardware failure in the active Cisco PGW 2200 Softswitch can also cause a switchover to the standby Cisco PGW 2200 Softswitch. The failover daemon in the standby Cisco PGW 2200 Softswitch detects the failure of the active Cisco PGW 2200 Softswitch and instructs the process manager to start a switchover. The standby Cisco PGW 2200 Softswitch then takes over all call-processing functions. The switchover is transparent to all Cisco ITP-Ls.

Troubleshooting Using Cisco PGW 2200 Softswitch Alarms

The Cisco PGW 2200 Softswitch generates alarms to indicate problems with processes, routes, linksets, signaling links, and bearer channels. The *Cisco PGW 2200 Softswitch Release 9 Messages Reference* lists all of the Cisco PGW 2200 Softswitch alarms and logs, and provides descriptions, possible causes, and suggested actions. You can find procedures for alarms that require you to take corrective action in the "Alarm Troubleshooting Procedures" section on page 6-4.

The active alarm log files reside in the /opt/CiscoMGC/var/log directory. These alarm log files are archived based on the criteria that are set in the dmprSink.dat file. For more information on the dmprSink.dat file, see the "Configuring the Data Dumper" section on page A-2.

The following sections describe troubleshooting using the Cisco PGW 2200 Softswitch alarms:

- Retrieving All Active Alarms, page 6-3
- Acknowledging Alarms, page 6-3
- Alarm Troubleshooting Procedures, page 6-4

Retrieving All Active Alarms

To retrieve all active alarms, log in to the active Cisco PGW 2200 Softswitch, start a Man-Machine Language (MML) session, and enter the **rtrv-alms** command:

The system returns a response that shows all active alarms. See the following:

```
Media Gateway Controller 2000-02-26 11:41:01
M  RTRV
   "LPC-01: 2000-02-26 09:16:07.806,"
   "LPC-01:ALM=\"SCMGC MTP3 COMM FAIL\",SEV=MJ"
   "IOCM-01: 2000-02-26 09:17:00.690,"
   "IOCM-01:ALM=\"Config Fail\",SEV=MN"
   "MGC1alink2: 2000-02-26 09:17:47.224,ALM=\"SC FAIL\",SEV=MJ"
   "MGC1alink3: 2000-02-26 09:17:47.225,ALM=\"SC FAIL\",SEV=MJ"
   "MGC1alink4: 2000-02-26 09:17:47.226,ALM=\"SC FAIL\",SEV=MJ"
   "MGC2alink1: 2000-02-26 09:17:47.227,ALM=\"SC FAIL\",SEV=MJ"
   "MGC2alink2: 2000-02-26 09:17:47.227,ALM=\"SC FAIL\",SEV=MJ"
   "MGC2alink4: 2000-02-26 09:17:47.229,ALM=\"SC FAIL\",SEV=MJ"
   "dpc5: 2000-02-26 09:17:47.271,ALM=\"PC UNAVAIL\",SEV=MJ"
   "ls3link1: 2000-02-26 09:16:28.174,"
   "ls3link1:ALM=\"Config Fail\",SEV=MN"
   "ls3link1: 2000-02-26 09:18:59.844,ALM=\"SC FAIL\",SEV=MJ"
```

Acknowledging Alarms

Acknowledging an alarm does not clear the alarm. You can still retrieve it with the **rtrv-alm** MML command. To acknowledge an alarm, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **ack-alm:comp:"alarmCategory"** command:

Where:

- *comp*—MML name of the component. For a complete list of components, see the *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*. You can retrieve a list of provisioned components by entering the **prov-rtrv:all** MML command.
- *alarmCategory*—MML name of the associated alarm category. The name you enter must match exactly the name of the alarm as it is displayed.

For example, to acknowledge a signaling channel fail alarm (SC FAIL) that occurred on the link MGC2alink1, enter the **ack-alm:MGC2alink1:"SC Fail"** command:

Alarm Troubleshooting Procedures

This section contains alarms that require you to take corrective action. For a complete list of alarms, including alarms that do not require you to take corrective action, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.

All Conn Cntl Links Fail

This alarm occurs when the MGCP session loses a heartbeat, which indicates that the session is down.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 Follow the procedure to collect system data, which is detailed in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the associated media gateway are working properly.

Note To find information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on the media gateway, see the documentation for the specific media gateway.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 3.

Note To find information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an Ethernet interface card on the media gateway, see the documentation for the specific media gateway.

Step 3 Verify that the near-end and far-end MGCP sessions are operating normally. See the documentation for the affected media gateway.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

All C7 IP Links Fail

This alarm occurs when communication is lost to all Cisco ITP-Ls of every configured protocol family. This alarm is critical, and causes an automatic switchover, if a standby Cisco PGW 2200 Softswitch is present.

Note The XECfgParm.dat parameter, *.AllLinksFailCausesFailover, controls the generation of this alarm. When this parameter is set to *false* (the default value), this alarm is not generated when the alarm condition occurs. If you want the Cisco PGW 2200 Softswitch to generate this alarm, you must set the parameter to *true*. See the procedure that is described in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If your Cisco PGW 2200 Softswitches are in separate geographic locations, you should set the value of *AllLinksFailCausesFailover to *true*.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 If your system is provisioned with destinations that use more than one version of SS7, ensure that this alarm is configured correctly, as described in the "Verifying Configuration to Support Multiple Versions of SS7" section on page 6-121.

Step 3 Verify that the Cisco ITP-Ls are operating normally. See the documentation for the Cisco 2800 Series Integrated Services Routers.

Step 4 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the Cisco ITP-Ls are working properly.

Note To find information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 5.

Note To find information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an interface card on the Cisco ITP-L, see Cisco 2800 Series Integrated Services Routers.

Step 5 Verify that the configuration for your system is correct. To verify the provisioning data for your Cisco PGW 2200 Softswitch, use the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69. To verify the provisioning data for the Cisco ITP-Ls, use the **show** commands.

If the configuration of the Cisco PGW 2200 Softswitch is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration of the Cisco ITP-Ls is incorrect, modify the provisioning data for your system. See *Cisco Signaling Link Terminal* document for more information.

If the configuration of both the Cisco PGW 2200 Softswitch and the Cisco ITP-Ls are correct, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

All ISDN BRI IP Conn Fail

This alarm occurs when all IP connections that support an ISDN BRI data pathway have failed.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the health of the associated media gateway by using the procedures in the user documentation for the media gateway.

If the media gateway is working correctly, proceed to Step 3.

If the media gateway is not working correctly, restore it using the procedures in the user documentation for the media gateway. If those procedures restore the media gateway and this alarm clears, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Verify the cabling between the Cisco PGW 2200 Softswitch and the switch is functioning.

If the cables are functioning properly, proceed to Step 4.

If you find a bad cable, replace it. If replacing a cable resolves the problem, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Verify the functioning of the associated switch. See the documentation for the switch for the necessary steps.

If the switch is functioning properly, proceed to Step 5.

If the switch is not functioning properly, see the appropriate troubleshooting procedures in the documentation for the switch. If those methods correct the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 5 Check the IP connectivity between the Cisco PGW 2200 Softswitch and the associated Cisco BRI voice gateway.

If the IP connectivity is good, proceed to Step 6.

If the IP connectivity is bad, restore the IP connectivity. If the alarm clears after the IP connectivity is restored, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the provisioning data for your ISDN BRI backhaul connect is correct. To verify the provisioning data, use the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the provisioning data is correct, proceed to Step 7.

If the provisioning data is not correct, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

All ISDN IP Conn Fail

This alarm occurs when communication is lost to all ISDN IP connections. The severity of this alarm is Critical, which causes an automatic switchover if a standby Cisco PGW 2200 Softswitch is present.

Note The ability to change the severity level of this alarm is implemented in the patch (CSCOgs059) for Release 9.5(2). The XECfgParm.dat parameter, *.AllISDNLinksFailCausesFailover, now controls the severity level of this alarm. When this parameter is set to *false* (the default value), this alarm has a severity level of Major. If you set this parameter to *true*, this alarm has a severity level of Critical.

This parameter should be set to *true* if the Cisco PGW 2200 Softswitches are in separate geographic locations. You can also set this parameter to *true* if the system is not processing SS7 calls and you want your system to perform an automatic switchover if all the ISDN IP connections fail. To change the value of this parameter, use the procedure that is defined in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the affected media gateways are operating normally, as described in the associated documentation.

Step 3 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the media gateways are working properly.

Note To find information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on a media gateway, see the documentation for the specific media gateway.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 4.

Note You can find information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch in the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on a media gateway, see the documentation for the specific media gateway.

Step 4 Verify that the configuration for your system is correct. To verify the provisioning data for the Cisco PGW 2200 Softswitch, use the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69. To verify the provisioning data for the media gateways, use **show** commands, as described in the associated documentation.

If the configuration of the Cisco PGW 2200 Softswitch is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration of the media gateways is incorrect, modify the provisioning data for the media gateways. See the documentation that is associated with the media gateway for more information.

If the configuration of the Cisco PGW 2200 Softswitch and the media gateways are correct, then proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

AII M3UAKEY Ack Pending

This alarm occurs when the Cisco PGW 2200 Softswitch cannot send or receive traffic for the identified SS7 signaling service that is associated with a Cisco ITP.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for your Cisco ITP for more information.

Step 3 Retrieve the settings for the affected M3UA routing keys using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 The AS definitions should match the routing contexts of the M3UA routing keys. If they match, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the routing contexts of the M3UA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the routing contexts corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the AS is not shutdown on the Cisco ITP. See the documentation for your Cisco ITP for more information. If the AS is shut down, restart it. Otherwise, proceed to Step 7.

If tending to the AS corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Note If you modify an ss7path that is configured for M3UAKEY, the system generates the "All M3UAKEY Ack Pending" alarm for all the other ss7paths that are configured with the same M3UAKEY, although they are not being modified.

Coincidentally, when you modify an ss7path, the system generates the M3UAKEY Ack Pending alarms when the **prov-cpy** and **prov-dply** commands are being processed. However, these alarms are cleared after the commands have been completed.

When the **prov-cpy** and **prov-dply** commands are being processed, no new calls can be placed on any of the ss7paths for which alarms were generated. However, the calls that already exist on the ss7paths are not affected.

All M3UA Assoc Fail

This alarm occurs when all M3UA associations transporting SS7 signaling have failed.

Note The XECfgParm.dat parameter, *.AllLinksFailCausesFailover, now controls the generation of this alarm. When this parameter is set to *false* (the default value), this alarm is not generated when the alarm condition occurs. For the Cisco PGW 2200 Softswitch to generate this alarm, set the parameter to *true*, by using the procedure that is defined in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If the Cisco PGW 2200 Softswitches are in separate geographic locations, set the value of *AllLinksFailCausesFailover to *true*.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Cisco ITPs are operating normally. See the documentation for your Cisco ITP for more information.

If ensuring that the Cisco ITPs operate normally corrects the problem, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the Cisco ITPs are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on a Cisco ITP, see the documentation for the Cisco ITP.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 4.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an Ethernet interface card on the Cisco ITP, see the documentation for the Cisco ITP.

Step 4 Verify that the M3UA provisioning data on the Cisco PGW 2200 Softswitch is correct.

If the provisioning data is correct, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the M3UA provisioning data, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the M3UA provisioning data corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

All SUAKEY Ack Pending

This alarm occurs when the Cisco PGW 2200 Softswitch cannot send or receive traffic for the identified SS7 subsystem.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for your Cisco ITP for more information.

Step 3 Retrieve the settings for the affected SUA routing keys using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 The AS definitions should match the routing contexts of the SUA routing keys. If they match, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the routing contexts of the M3UA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the routing contexts of the M3UA routing keys corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the AS is not shut down on the Cisco ITP. See the documentation for your Cisco ITP for more information. If the AS is shut down, restart it. Otherwise, proceed to Step 7.

If tending to the AS corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

All SUA Assoc Fail

This alarm occurs when all SUA associations transporting SS7 signaling have failed.

Note The XECfgParm.dat parameter, *.AllLinksFailCausesFailover, now controls the generation of this alarm. When this parameter is set to *false* (the default value), this alarm is not generated when the alarm condition occurs. For the Cisco PGW 2200 Softswitch to generate this alarm, set the parameter to *true*, by using the procedure that is defined in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If the Cisco PGW 2200 Softswitches are in separate geographic locations, set the value of *AllLinksFailCausesFailover to *true*.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Cisco ITPs are operating normally. See the documentation for your Cisco ITP for more information.

If ensuring that the Cisco ITPs are operating normally corrects the problem, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the Cisco ITPs are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on a Cisco ITP, see the documentation for the Cisco ITP.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 4.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an Ethernet interface card on the Cisco ITP, see the documentation for the Cisco ITP.

Step 4 Verify that the SUA provisioning data on the Cisco PGW 2200 Softswitch is correct.

If the provisioning data is correct, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the SUA provisioning data, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the SUA provisioning data corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: ALoopCtrExceeded

This alarm occurs when an A-number analysis operation has gone into an infinite loop. The purpose of the alarm is to limit the number of passes spent in the analysis tree to 30.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Validate that there are no infinite loops in the A-number dial plan, as described in the "Verifying a Dial Plan Translation" section on page 3-135.

If there are infinite loops in your A-number dial plan, modify the settings in your A-number dial plan to remove the infinite loops, using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If there are no infinite loops in your A-number dial plan, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: ATableFail_GetDigMod

This alarm occurs when an attempt to retrieve a modification string fails during A-number analysis. The problem occurs when the modification table is not loaded or the system provides a pointer to a nonexistent location in the modification table.

Corrective Action

To correct the problem that this alarm identifies, verify that the dial plan file was loaded correctly, by using the procedure that is described in "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: ATableFail_GetResult

This alarm occurs when access to the result table failed during A-number analysis. The problem occurs if the result table is not loaded or the system provides a pointer to a nonexistent location in the result table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: ATableFlt_DgtRangeError

This alarm occurs when the A-number analysis digit tree has been accessed with a digit that is out of range for the digit tree table. This alarm could occur if the system was incorrectly configured to support a base 10 dial plan, and an overdecadic digit was received from the line and passed to analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the parameter, *.OverdecadicDigitsEnabled, is set correctly in the XECfgParm.dat file on each host.

Note The setting of this parameter should reflect the dial plan restrictions for the protocol in use. If the configured protocol supports the use of overdecadic digits, you should set the parameter to *true*. If the configured protocol does not support the use of overdecadic digits, you should set the parameter to *false*.

If the setting for the parameter is correct, proceed to Step 3. Otherwise, reboot your software using the procedure that is described in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Step 3 If the setting for the parameter is *false*, check the received digit string for presence of an overdecadic digit. If the digit string does not have an overdecadic digit, proceed to Step 5. If the digit string does have an overdecadic digit, proceed to Step 4.

If the setting for the parameter is *true*, proceed to Step 5.

Step 4 Check the compliancy documentation for the configured protocol.

If the documentation indicates that overdecadic digits are supported, change the setting for the *.OverdecadicDigitsEnabled XECfgParm.dat parameter to *true* on both hosts, by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If the documentation indicates that overdecadic digits are not supported, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: BLoopCtrExceeded

The alarm occurs when a B-number analysis operation has gone into an infinite loop. The purpose of the alarm is to limit the number of passes spent in the analysis tree to 30.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Validate that there are no infinite loops in the B-number dial plan, as described in the "Verifying a Dial Plan Translation" section on page 3-135.

If there are infinite loops in your B-number dial plan, modify the settings in your B-number dial plan to remove the infinite loops, by using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If there are no infinite loops in your B-number dial plan, then proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: BNum_GetFail_SrvcTbl

This alarm occurs during B-number analysis when a screening result is encountered and an attempt to read the service table to determine the name of the service performing the screening fails. This failure is because of corruption of either the result table or the service table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: BNum_MdfyBFail_ AnnounceID

This alarm occurs during B-number analysis when an announcement result is encountered and analysis is unable to replace the last four digits of the B-number with the announcement ID. An out-of-range announcement ID (it should be 0–9999) or a B-number less than four digits long commonly causes this replacement failure.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that all the configured announcement IDs are within the range 0 through 9999, by using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If any of the announcement IDs are outside of the range, modify its value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: BTableFail_GetDigTree

This alarm occurs if you specified an invalid path for B-number analysis or if the B-number analysis table is not loaded.

Corrective Action

To correct the problem that this alarm identifies, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: BTableFail_GetDigMod

This alarm occurs when an attempt to retrieve a modification string during B-number analysis fails. The problem occurs if the modification table is not loaded or the system provides a pointer to a nonexistent location in the modification table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: BTableFail_GetResult

This alarm occurs when access to the result table failed during B-number analysis. The problem occurs if the result table is not loaded or the system provides a pointer to a nonexistent location in the result table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: BTableFlt_DgtRangeError

This alarm occurs when the B-number analysis digit tree has been accessed with a digit that is out of range for the digit tree table. This alarm could occur if the system was incorrectly configured to support a base 10 dial plan, and an overdecadic digit was received from the line and passed to analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the parameter, *.OverdecadicDigitsEnabled, is set correctly in the XECfgParm.dat file on each host.

Note The setting of this parameter should reflect the dial plan restrictions for the protocol in use. If the configured protocol supports the use of overdecadic digits, set the parameter to true. If the configured protocol does not support the use of overdecadic digits, set the parameter to false.

If the setting for the parameter is correct, proceed to Step 3. Otherwise, update the parameter settings in the XECfgParm.dat files by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Step 3 If the setting for the parameter is *false*, check the received digit string for presence of an overdecadic digit. If the digit string does not have an overdecadic digit, proceed to Step 5. If the digit string does have an overdecadic digit, proceed to Step 4.

If the setting for the parameter is *true*, proceed to Step 5.

Step 4 Check the compliancy documentation for the configured protocol.

If the documentation indicates that overdecadic digits are supported, change the setting for the *.OverdecadicDigitsEnabled XECfgParm.dat parameter to *true* on each host using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If the documentation indicates that overdecadic digits are not supported, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Cause_GetFail_CauseTbl

This alarm occurs during cause analysis when the cause table is unreadable. The cause table can be unreadable if the cause table is corrupted, if the underlying software failed, or if the cause table was built without all of the existing call context cause values.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the associated cause table contains all of the existing call context cause values, by using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the cause table is incomplete, modify its value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, by using the procedure that is described in "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:Cause_GetFail_DigModTbl

This alarm occurs during cause analysis when a B-number modification result is encountered and the digit modification string is unreadable. This problem can occur if the digit modification table is corrupted or if an incorrect digit modification index was stored in the B-number modification results data.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the associated B-number digit modification table is correct, by using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the information in the B-number digit modification table is incorrect, modify its value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, as is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Cause_GetFail_InvldRsltType

This alarm occurs during cause analysis when a result is encountered that is not supported in cause analysis. This problem is due to corruption of the cause or location tables or the result table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:Cause_GetFail_LocTbl

This alarm occurs during cause analysis when the location table is unreadable. This problem can occur if the location table is corrupted, the underlying software fails, or the location table is not fully populated with all possible references from the cause table.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the associated location table contains all of the possible references from the cause table, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the location table does not contain all of the references, modify its value by using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:Cause_GetFail_RsltTbl

This alarm occurs during cause analysis when the result table is unreadable. This problem can occur if the result table is corrupted, the underlying software fails, or the result table is not fully populated with all possible references from the cause and location tables.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the associated result table contains all the possible references from the cause and location tables, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the result table does not contain all the references, modify its value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:Cause_InvldRslts_CauseTbl

This alarm occurs when cause analysis successfully reads the cause table but the value that is returned is logically invalid. Cause analysis gets two values from the cause table: an immediate result index and a location index. The immediate result index indicates that analysis should start reading results now, but the location index indicates that another table read is required to find the correct result table index. These results are logically incompatible. Most likely this results from a failure of the underlying software or a corruption of the cause table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Cause_MdfyBFail_AnnounceID

This alarm occurs during cause analysis when an announcement result is encountered and analysis is unable to replace the last four digits of the B-number with the announcement ID. An out-of-range announcement ID (it should be 0 to 9999) or a B-number less than four digits long usually causes this problem.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the affected announcement ID is within the range 0 through 9999, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the announcement ID is outside of the range, modify its value using the **numan-ed** MML command and proceed to Step 3. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Otherwise, proceed to Step 3.

Step 3 Verify that the affected B-number is at least four digits long, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the affected B-number is less than four digits long, modify its value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Otherwise, proceed to Step 4.

Step 4 If you modified your dial plan, save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 5.

Step 5 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Cause_MdfyBFail_AppPtInvId

This alarm occurs during cause analysis when a B-number modification result is encountered and the application point (where digits are inserted) specified is beyond the end of the digit string. This problem can occur if an incorrect application point is specified in the result data, a result table is corrupted, or cause analysis values are incorrectly constructed.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the specified application points in the result data are correct, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If any of the application points are incorrect, modify their value using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Cause_Rte_LoopDetected

This alarm occurs during cause analysis when a route or announcement result is encountered. In these cases, the indicated route identifier is compared to a list of previously provided results. If the system finds a match, it raises this alarm and returns an error to call processing. The system performs these actions to prevent calls from being endlessly routed to a single route or series of routes because of cause analysis interactions.

Corrective Action

To correct the problem that this alarm identifies, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: CustId/StartIdx Missing

This alarm occurs when the property CustGrpId is not present on the identified trunk group. The property CustGrpId must be present to enable the system to find the correct place to begin analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the value of the CustGrpId property for the associated trunk group is correct by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:trnkgrpprop:name="comp_name"** command:

Where:

comp_name is the MML name for the affected trunk group.

For example, if you wanted to verify the properties of the trunk group that is called 1001, enter the **prov-rtrv:trnkgrpprop:name="1001"** command:

If your system has been properly configured for dial plan use, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-01 10:09:47
M  RTRV
   "session=active:trnkgrpprop"
   /*
    .
    .
    .
CustGrpId=2222
    .
    .
    .
```

Step 3 If you need to modify your settings, start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 4 If the CustGrpId property is missing from the affected trunk group, enter the **prov-ed:trnkgrp:name="*comp_name*", CustGrpId=*number*** command:

Note If you are modifying the CustGrpId value for an SS7 signaling service, you must set that SS7 signaling service to the out-of-service administrative state, as described in the "Setting the Administrative State" section on page 6-124. After you have entered the CustGrpId value, you can return the SS7 signaling service to the in-service administrative state.

Where:

- *comp_name*—MML name for the affected trunk group.
- *number*—Customer group ID number that is associated with your dial plan.

Step 5 Save and activate your provisioning session as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If the alarm clears, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, See the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL:DataBaseAccessFail

This alarm occurs when certain functions in generic analysis have failed. The Cisco PGW 2200 Softswitch raises this alarm in response to a failure of any of the following general analysis functions:

- ReadANumDpSelection ()—Alarm is found in the Analysis MDL log.
- CheckEPortedHandling(VAR BNumRecd : BNumberElem, B_DgtBuff : Dgtbuff, VAR ResultsFromBnoForUpdate : AnalyseBnoResults): GeneralActionRslts—Alarm is found in the B_Analysis MDL log.
- CheckERouteNumHandling(B_DgtBuff : Dgtbuff, VAR ResultsFromBnoForUpdate: AnalyseBnoResults): GeneralActionRslts—Alarm is found in the B_Analysis MDL log.
- ANumberHandling()—Alarm is found in either the B_Analysis or A_Analysis MDL log.
- BNumberHandling()—Alarm is found in the MDL log as *B-Analysis*.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the parameter, engine.SysConnectDataAccess, is set to *true* in the XECfgParm.dat file on the active Cisco PGW 2200 Softswitch. If the setting is correct, proceed to Step 4. Otherwise, update the value of the parameter for each host, using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If correcting the setting does not clear the alarm, proceed to Step 4.

Step 3 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Data Failure Rcvd

This alarm occurs during analysis when the Cisco PGW 2200 Softswitch detects a data failure in the external routing engine.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:dpselection_table_fail

This alarm occurs when the Cisco PGW 2200 Softswitch cannot find the correct dial plan selection.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL:getDialplanBase_fail

This alarm occurs when the Cisco PGW 2200 Softswitch could not load or generate the dial plan.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: InvalidtrkGrpType

This alarm occurs when the analysis module has not provided a valid trunk group type. The problem occurs if the route analysis table specifies an invalid trunk group type.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Display the valid trunk group types using the **prov-rtrv** MML command that is described in the "Retrieving Provisioning Data" section on page 3-69.

Step 3 Correct the invalid trunk group type in the route analysis table using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If the alarm clears, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Prof_GetFail_DigModTbl

This alarm occurs during profile analysis when a B-number modification result is encountered and the digit modification string is unreadable. This problem can occur if the digit modification table is corrupted or an incorrect digit modification index is stored in the B-number modification results data.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_GetFail_InvldRslt

This alarm occurs during profile analysis when the Cisco PGW 2200 Softswitch encounters a result that is not supported in profile analysis. Corruption of either the NOA or NPI tables, or the result table, causes this problem.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_GetFail_NOATbl

This alarm occurs during profile analysis when the NOA table is unreadable. This problem can occur if the NOA table is corrupted, the underlying software fails, or the NOA table is built without all the existing call context NOA values.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the NOA table uses all of the existing call context NOA values using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the NOA table is missing any of the existing call context NOA values, add them using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_GetFail_NOATbl_A

This alarm occurs during profile analysis when the NOA table is unreadable. This problem can occur if the NOA table is corrupted or if the underlying software fails.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Prof_GetFail_NPITbl

This alarm occurs during profile analysis when the NPI table is unreadable. This problem can occur if the NPI table is corrupted, the underlying software fails, or the NPI table is not fully populated with all the possible references from the NOA table.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the NPI table uses all of the possible references from the NOA table using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the NPI table is missing any of the references from the NOA table, add them using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_GetFail_NPITbl_A

This alarm occurs during profile analysis when the NPI table is unreadable. This problem can occur if the NOA table is corrupted, the underlying software fails.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Prof_GetFail_RsltTbl

This alarm occurs during profile analysis when the result table is unreadable. This problem can occur if the result table is corrupted, the underlying software fails, or the result table is not fully populated with all the possible references from the NOA or NPI tables.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the result table uses all of the possible references from the NOA and NPI tables using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the result table is missing any of the references from the NOA and NPI tables, add them using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_InvIdNPAValue

This alarm occurs during profile analysis when the system encounters a 7-digit B-number and the NPA property is set against the originating trunk group. An NPA string of more or less than three characters is invalid. Data corruption is the most likely cause of this problem.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the NPA values have been properly provisioned for the trunk group by using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If the NPA values are incorrect, modify them using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_InvRslts_NOATbl

This alarm occurs when profile analysis successfully reads the NOA table but the value that is returned is logically invalid. Profile analysis gets two values from the NOA table: an immediate result index and an NPI index. An immediate result index indicates that analysis should start reading results now, but an NPI index indicates that another table read is required to find the correct result table index. These results are logically incompatible. Most likely this results from a failure of the underlying software or a corruption of the NOA table.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: Prof_InvRslts_NOATbl_A

This alarm occurs when profile analysis successfully reads the NOA table but the value that is returned is logically invalid. Profile analysis gets two values from the NOA table, an immediate result index and an NPI index. The immediate result index indicates that analysis should start reading results now but the NPI index indicates that another table read is required to find the correct result table index. These results are logically incompatible. Most likely, the system raises this alarm when it detects a failure of the underlying software or a corruption of the NOA table.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Prof_MdfyBFail_AppPtInvld

This alarm occurs during profile analysis when the system encounters a B-number modification result and the specified application point (where digits are inserted) is beyond the end of the digit string. This problem can occur if an incorrect application point is specified in the result data, a result table is corrupted, or profile analysis values are incorrectly constructed.

Corrective Action

To correct the problem that this alarm identifies, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the specified application points in the result data are correct, using the **numan-rtrv** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information.

If any of the application points are incorrect, modify their value by using the **numan-ed** MML command. See *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide* for more information. Save and activate your dial plan changes as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. Otherwise, proceed to Step 3.

Step 3 Verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: RteStartIndexInvalid

This alarm occurs when the start index for the route analysis table is invalid.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the data for the provisioned route lists is correct by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:rtlist:"all"** command:

Step 3 If the data for the route lists is incorrect, correct it by using the **prov-ed** MML command. Otherwise, proceed to Step 4. See the *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on provisioning route lists.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: Rte_TableHopCtrExceeded

This alarm occurs when generic analysis fails because of an excessive number of routing table changes.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Test for a loop in the routing configuration by completing the following steps:

a. Export the routing configuration to a file, as described in the "Exporting Provisioning Data" section on page 3-76.

b. Import the routing configuration file that is created in Step 2a, as described in the "Importing Provisioning Data" section on page 3-75.

If the import fails, proceed to Step 3. Otherwise, proceed to Step 4.

Step 3 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: RteTableFail_GetRteList

This alarm occurs when access to the route list failed. The problem occurs if the index to the route list is not valid or if the route list is not loaded.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: RteTableFail_GetTrkAttrdata

This alarm occurs when access to the trunk group attribute data table failed. The problem occurs if the index to the trunk group attribute data table is not valid or if the table is not loaded.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: RteTableFail_GetTrkGrpdata

This alarm occurs when access to the trunk group data failed. The problem occurs if the index to the trunk group data is not valid or if the trunk group data table is not loaded.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly. Use the procedure described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: RteTableFail_GetTrunkList

This alarm occurs when access to the trunk group list failed. The problem occurs if the index to the trunk group list is not valid or if the trunk group list is not loaded.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly. Use the procedure described in the"Verifying Proper Loading of a Dial Plan" section on page 6-121.

ANAL: TableFail_BearerCapTable

This alarm occurs when the bearer capability table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_CondRouteDescTable

This alarm occurs when the conditional route description table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_CondRouteTable

This alarm occurs when the system could not read the conditional routing table during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the dial plan file was loaded correctly, using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

If that procedure resolves the problem, the procedure is finished. Otherwise, proceed to Step 3.

Step 3 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_CPCTable

This alarm occurs when the calling party category (CPC) table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_RouteHolTable

This alarm occurs when route holiday table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_PercRouteTable

This alarm occurs when the percentage route holiday table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_TMRTable

This alarm occurs when the transmission medium requirements (TMR) table could not be read during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TableFail_TNSTable

This alarm occurs when the system cannot read the transit network selection (TNS) table during generic analysis.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ANAL: TrunkGrpRsltCtrExceeded

This alarm occurs when the analysis module provided the maximum number of candidate trunk groups allowed. The maximum number is 20. The purpose of the alarm is to limit the time spent searching for candidate trunk groups.

Corrective Action

To correct the problem, verify that the dial plan file was loaded correctly, by using the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

Association Degraded

This alarm occurs when one of the destination addresses for an SCTP association fails, but the association is still in-service (IS).

Corrective Action

To correct the problem, perform the procedure in the "Resolving an Association Alarm" section on page 6-122.

Association Fail

This alarm occurs when an SCTP association fails because of an IP connectivity failure or an out-of-service (OOS) destination.

Corrective Action

To correct the problem, perform the procedure in the "Resolving an Association Alarm" section on page 6-122.

C7LNK ALGNMT LOST

This alarm occurs when the MTP2 for the C7 link between a Cisco ITP-L and an associated APC loses alignment.

Corrective Action

To correct the problem, use the diagnostics on the affected Cisco ITP-L to determine why the link lost alignment. See the "Verifying the Link Alignment Status" section on page B-6.

C7DPC CONGESTION

This alarm occurs when a link in a signaling route towards a given DPC becomes congested or when a DPC is congested and has sent a congestion indication to the Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify the status of the links that are associated with the affected DPC, as described in the "Retrieving Service State of C7/SS7 Links or Linksets" section on page 3-45.

If none of the links are out-of-service, this alarm occurred because the DPC is congested. Corrective action is not necessary. Wait for the congestion condition to clear.

If any of the links are out-of-service, proceed to Step 3.

Step 3 Return the out-of-service links to service, as described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105.

If that does not resolve the problem, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

C7LNK CONGESTION

This alarm occurs when an SS7 MTP2 link becomes congested and it cannot receive any more messages.

Corrective Action

If this alarm occurs repeatedly, perform the following steps to correct the problem:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Reduce the amount of traffic from the far-end that is associated with the affected link.

If that clears the alarm, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Add additional links to the linkset associated with the affected link. See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information about adding links.

If that does not resolve the problem, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

C7LNK INHIBIT

This alarm occurs when a C7 link has been inhibited for maintenance.

Corrective Action

To correct the problem, uninhibit the specified C7 link, as described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105, when the maintenance is complete.

C7SLTLnkCong

This alarm occurs when an SS7 link on a 4-link Cisco ITP-L is congested.

Corrective Action

If this alarm occurs repeatedly, perform the following steps to correct the problem:

Step 1 To collect system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Reroute the SS7 traffic to other links to reduce the congestion. See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information about adding links.

If that does not resolve the problem, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Call Back Feature Insertion Failure

This alarm occurs when an attempt to insert a call-back feature entry in the main memory database fails. When this insertion fails, the call-back feature does not work.

Corrective Action

Contact the Cisco TAC to analyze the problem and determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Call Back Feature Deletion Failure

This alarm occurs when an attempt to delete a call-back feature entry from the main memory database fails. When this deletion fails, the call-back feature does not work.

Corrective Action

Contact the Cisco TAC to analyze the problem and determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Charge Table Access Failure

This alarm occurs when the Cisco PGW 2200 Softswitch cannot access the charge table.

Corrective Action

To correct the problem, check for the presence of the Charge Table Load Failure alarm, using the procedure in the "Retrieving All Active Alarms" section on page 6-3. If this alarm is present, perform the corrective action for that alarm. Otherwise, the procedure is complete.

Charge Table Load Failure

This alarm occurs when a Cisco PGW 2200 Softswitch process is unable to load the charge table.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify whether a charge table is present on your system by logging in to your active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:charge:"all"** command:

The system responds with a list of elements in the charge table, or with an error indicating that a charge table does not exist.

If a charge table is not present, provision a charge table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

If a charge table is present, verify that the information returned is correct. If the information is correct, proceed to Step 3. Otherwise, correct the contents of the charge table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Comm Srvc Creation Error

This alarm occurs when an error occurred while creating or opening a communication service.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Shut down the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 3 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Hardware" section on page 2-2.

Step 4 Perform a manual switchover operation, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 5 Shut down the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 6 Restart the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 7 Perform a manual switchover operation, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately 3 seconds. This switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

If the switchover does not resolve the alarm, proceed to Step 8.

Step 8 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Config Fail

This alarm occurs when the configuration has failed.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Search the active system log file, as described in the "Viewing System Logs" section on page 6-90, for logs that indicate errors in the content of the provisioning data.

If there are no logs that indicate errors in the content of the provisioning data, proceed to Step 3.

If there are logs that indicate errors in the content of the provisioning data, start a dynamic reconfiguration session to change the settings for the components that are identified in the log messages. See the "Invoking Dynamic Reconfiguration" section on page 3-66.

If changing component settings corrects the problem, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

CTI Connection Failed

This alarm occurs when the CTI connection to the Cisco CallManager cluster has failed.

Corrective Action

To correct the problem, perform the following steps:

Step 1 Collect diagnostic information from your system.

Step 2 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the Cisco CallManager cluster are working properly.

Determine the status of the Ethernet interfaces on the Cisco PGW 2200 Softswitch by using the Cisco IPT Platform Administration application. See the online Help topic for this subject for more information. You can find information on verifying the proper functioning of an Ethernet interface on the Cisco CallManager cluster in the associated documentation.

If the Ethernet connections are working correctly, proceed to Step 4. Otherwise, proceed to Step 3.

Step 3 If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. After the replacement is complete, return to Step 2.

Find information on removing and replacing an Ethernet interface card on either platform in the documentation that came with the platform.

Step 4 Verify that the MGCP sessions are operating normally. See the documentation for the affected media gateway for more information on verifying the functioning of the MGCP sessions.

If the MGCP sessions are not operating normally, return the MGCP sessions to normal operations, as described in the documentation for the affected Cisco CallManager cluster. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

CTI Version Mismatch

This alarm occurs when the CTI version of the CTI Manager component that is configured on Cisco PGW 2200 Softswitch is not compatible with the version on the CTI Manager.

Corrective Action

Check the version of CTI Manager and install appropriate patches on the Cisco PGW 2200 Softswitch to make it compatible with the version on CTI Manager.

Dial Plan Loading Failed

This alarm occurs when a dial plan did not load properly.

Corrective Action

To correct the problem, verify that the dial plan file loaded correctly. Use the procedure that is described in the "Verifying Proper Loading of a Dial Plan" section on page 6-121.

DISK

This alarm occurs when the system disk is running out of space.

Corrective Action

To correct the problem, delete any unnecessary files from the Cisco PGW 2200 Softswitch, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

EISUP: Unexpected Msg/Par

This alarm occurs when the EISUP module receives an unsupported message or parameter. This alarm is most likely to occur when the local EISUP version is older than the EISUP version used by the Cisco PGW 2200 Softswitch or the Cisco H.323 Signaling Interface (HSI) on the other end.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 To upgrade the version of EISUP locally, you must either upgrade the Cisco PGW 2200 Softswitch software to the same release as the other Cisco PGW 2200 Softswitch, or to the release supported by your current version of the Cisco HSI software.

The steps that are required to upgrade the Cisco PGW 2200 Softswitch software are in *Cisco PGW 2200 Softswitch Release 9 Software Installation and Configuration Guide*.

If upgrading the Cisco PGW 2200 Softswitch software clears the alarm, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ENGINE CONFIG FAIL

This alarm occurs when a component in the engine configuration fails.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Search the active system log file for log messages indicating which component is raising this alarm. Use the procedure that is described in the "Viewing System Logs" section on page 6-90.

If there are logs that indicate a failed component, proceed to Step 3.

If there are no logs that indicate a failed component, proceed to Step 4.

Step 3 Begin a dynamic reconfiguration session to reprovision the failed component. Use the procedure that is described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

FAIL

This alarm occurs when the component referenced in the alarm failed. The failure might affect service, in which case, the system raises other alarms.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 If the component identified in the alarm text is in the system software, contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

If the component identified in the alarm text is a component of system hardware, proceed to Step 3.

Step 3 Shut down the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 4 Restart the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 5 Perform a manual switchover, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 6 Shut down the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 7 Restart the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 8.

Step 8 Replace the component that is identified in the alarm text. You can find procedures for replacing Cisco PGW 2200 Softswitch hardware in the associated Sun Microsystems documentation. For procedures to replace Cisco ITP-L hardware, see the documentation for the Cisco 2800 Series Integrated Services Routers. Find procedures for replacing Cisco switch hardware in the documentation for the switch.

Step 9 Contact the Cisco TAC to analyze the problem further and to determine a solution. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

FailoverPeerLost

This alarm occurs when the failover daemon on the standby Cisco PGW 2200 Softswitch is not reachable.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Ethernet interfaces between the active and standby Cisco PGW 2200 Softswitches and the Cisco switches are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on the Cisco switches, see the documentation for your switch.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 3.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an Ethernet interface card on the Cisco switch, see the documentation for your switch.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

FailoverPeerOOS

This alarm occurs when the failover daemon goes out-of-service in the standby Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, check the alarms on the standby Cisco PGW 2200 Softswitch. Use the procedure in the "Retrieving All Active Alarms" section on page 6-3, and resolve those alarms.

FAIL REMOTE STANDBY

This alarm occurs on the active Cisco PGW 2200 Softswitch when a synchronization operation between the active and standby Cisco PGW 2200 Softswitches fails. The system automatically clears this alarm if a synchronization operation succeeds after the failure. If the synchronization succeeds, the system triggers the Standby Warm Start alarm. See the "Standby Warm Start" section on page 6-75 for more information.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the standby Cisco PGW 2200 Softswitch is in the standby platform state. Use the procedure that is defined in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2.

If the standby Cisco PGW 2200 Softswitch is in the standby platform state, proceed to Step 3. Otherwise, proceed to Step 4.

Step 3 Synchronize the standby Cisco PGW 2200 Softswitch with the active Cisco PGW 2200 Softswitch by entering the **prov-sync** MML command.

Step 4 Shut down the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 5 Restart the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

FORCE NODE RESTART

This alarm occurs on the standby Cisco PGW 2200 Softswitch when a new SS7 IOCC is added to the configuration of the system. This alarm causes the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch to be rebooted. This alarm does not affect the active Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, perform the following steps:

Step 1 When the Cisco PGW 2200 Softswitch software has restarted on the standby Cisco PGW 2200 Softswitch, collect system data. Refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the standby Cisco PGW 2200 Softswitch is in the standby platform state, using the procedure that is defined in the "Verifying the Platform State of the Cisco PGW 2200 Softswitches" section on page 3-2.

If the standby Cisco PGW 2200 Softswitch is in the standby platform state, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Gen Fail

This alarm occurs when a failure occurs because of resource exhaustion or configuration problems, such as the following:

- Memory exhaustion
- Queue overflow
- Message congestion
- IPC file cannot be opened
- Expired timer

Log messages in the active system log file indicate the nature of the failure. For the majority of the failures, this alarm is informational and no user action is required. If the system generates this alarm because it cannot open an IPC file, you must take corrective action.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Search the active system log file, as described in the "Viewing System Logs" section on page 6-90, for logs that indicate that an IPC file cannot be opened.

If there are no logs that indicate that an IPC file cannot be opened, no further action is required.

If there are logs that indicate that an IPC file cannot be opened, proceed to Step 3.

Step 3 Shut down the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 4 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 5 Perform a manual switchover, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 6 Shut down the Cisco PGW 2200 Softswitch software on your newly standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 7 Restart the Cisco PGW 2200 Softswitch software on your newly standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 8.

Step 8 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Holiday Table Access Failure

This alarm occurs when the Cisco PGW 2200 Softswitch cannot access the holiday table.

Corrective Action

To correct the problem, check for the presence of the Holiday Table Load Failure alarm, by using the procedure in the "Retrieving All Active Alarms" section on page 6-3. If this alarm is present, perform the corrective action for that alarm. Otherwise, the procedure is complete.

Holiday Table Load Failure

This alarm occurs when a Cisco PGW 2200 Softswitch process is unable to load the holiday table.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify whether a holiday table is present on your system by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:holiday:"all"** command:

The system responds with a list of elements in the holiday table, or with an error indicating that a holiday table does not exist.

If a holiday table is not present, provision a holiday table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

If a holiday table is present, verify that the information returned is correct. If the information is correct, proceed to Step 2. Otherwise, correct the contents of the holiday table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

INVALID M3UA RC

This alarm occurs when the Cisco PGW 2200 Softswitch receives an M3UA message from the identified Cisco ITP that includes a routing context that has not been provisioned on the Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for the Cisco ITP for more information.

Step 3 Retrieve the settings for the affected M3UA routing keys by using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 Identify the AS defined on the Cisco ITP that is not provisioned as a routing context on the Cisco PGW 2200 Softswitch.

Step 5 Open a dynamic reconfiguration session to add the routing context to the M3UA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If adding the routing context to the M3UA routing keys corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

INVALID SUA RC

This alarm occurs when the SUA routing keys that are defined on the Cisco PGW 2200 Softswitch do not match the SUA routing keys that are defined on the signaling gateway.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for your Cisco ITP for more information.

Step 3 Retrieve the settings for the affected SUA routing keys by using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 Identify the AS defined on the Cisco ITP that is not provisioned as a routing context on the Cisco PGW 2200 Softswitch.

Step 5 Open a dynamic reconfiguration session to add the routing context to the SUA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If adding the routing context corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Invalid Virtual_IP_Addr

This alarm occurs when the configured virtual IP address is not part of the networks that are associated with the IP addresses set for the IP_Addr1 or IP_Addr2 parameters in the XECfgParm.dat file.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the IP address defined for the XECfgParm.dat parameter, *.Virtual_IP_Addr, is set correctly in the XECfgParm.dat file on each host.

Note The IP address that is defined for this parameter should be a part of the networks that are associated with the IP addresses defined for the XECfgParm.dat parameters IP_Addr1 or IP_Addr2.

If the setting for the parameter is correct, proceed to Step 3. Otherwise, reboot your software using the procedure that is described in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

IP CONNECTION FAILED

This alarm occurs when the Cisco PGW 2200 Softswitch loses network (IP) connectivity to a Cisco ITP-L. The Cisco PGW 2200 Softswitch generates this alarm for each SS7 link that is associated with the affected Cisco ITP-L.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the affected Cisco ITP-L is operating. See the documentation for the Cisco 2800 Series Integrated Services Routers.

If the affected Cisco ITP-L is not operating, start it using the procedure in the "Cisco SS7 Interface Startup Procedure" section on page 2-3. If starting the Cisco ITP-L does not resolve the problem, replace the affected Cisco ITP-L. See the documentation for the Cisco 2800 Series Integrated Services Routers.

If the affected Cisco ITP-L is operating, proceed to Step 3.

Step 3 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the affected Cisco ITP-L are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on the Cisco ITP-L, see the documentation for the Cisco 2800 Series Integrated Services Routers.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 4.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing components on the Cisco ITP-L, see the documentation for the Cisco 2800 Series Integrated Services Routers.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

IP RTE CONF FAIL

This alarm occurs when an IP route cannot access the local interface that its IP address parameter defined.

Corrective Action

To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93. Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

IP RTE FAIL

This alarm occurs when an IP route is in the OOS state with a cause other than off-duty or commanded out-of-service.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify the IP addresses of the local interfaces on the standby Cisco PGW 2200 Softswitch by using the **ifconfig -a** UNIX command.

The system returns a response indicating the IP addresses of your local interfaces.

Step 3 Verify that the IP addresses obtained in Step 2 match the values that are set for the IP_Addr1 through IP_Addr4 parameters in the XECfgParm.dat file.

If the settings for the local IP addresses are not the same, proceed to Step 4.

If the settings for the local IP addresses are the same, proceed to Step 12.

Step 4 Log in to your active Cisco PGW 2200 Softswitch and change directories to the /opt/CiscoMGC/etc directory using the **cd /opt/CiscoMGC/etc** UNIX command:

Step 5 Open the XECfgParm.dat file in a text editor, such as vi.

Step 6 Search for the IP_Addr properties and change the properties that are not configured correctly.

Step 7 Save the file and exit the text editor.

Step 8 Shut down the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch by entering the **/etc/init.d/CiscoMGC stop** UNIX command:

Note Shutting down the Cisco PGW 2200 Softswitch software on the active Cisco PGW 2200 Softswitch causes the currently standby Cisco PGW 2200 Softswitch to become the active Cisco PGW 2200 Softswitch.

Step 9 Restart the Cisco PGW 2200 Softswitch software on this Cisco PGW 2200 Softswitch by entering the **/etc/init.d/CiscoMGC start** command:

Step 10 When the Cisco PGW 2200 Softswitch software is fully activated, log in to the active Cisco PGW 2200 Softswitch and perform a manual switchover, using the **sw-over::confirm** MML command:

Step 11 Repeat Step 2 through Step 9 on the newly standby Cisco PGW 2200 Softswitch.

If the problem has not been resolved after you have completed those steps, proceed to Step 12.

Step 12 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ISUP: COT Failure

This alarm occurs when the Cisco PGW 2200 Softswitch receives a COT message that indicates a failed continuity test.

Corrective Action

To correct the problem, run a manual COT test, as described in the "Running a Manual Continuity Test" section on page 6-149.

License server unreachable

This alarm appears if the license server is unavailable. The Cisco PGW 2200 Softswitch looks at the local license files to retrieve the configuration time TDM ports/ the run time license information. Simultaneously, a timer starts.

If the license server is still unreachable after one week, the license number is half of the license number in license files.

If the license server is still unreachable after eight weeks, the license number is the number of demo licenses.

Corrective Action

If the license server unreachable alarm appears, use the **rtrv-lics** output to determine how many days license server has been unreachable.

Follow these steps to resolve this problem.

Step 1 Go to the machine where the license server is running (see the first line of the license file for the server hostname).

Step 2 Enter the **ps -ef |grep lmgrd** command to see whether the license server daemon is running.

a. If the license server is not running, enter the **/opt/CiscoMGC/local/reload_lics.sh** command to restart the license server.

b. If the license server still fails to start, check the **/opt/CiscoMGC/var/log/flexlm_server.log** for detailed information or contact Cisco TAC.

c. If the license server is running, but the active Cisco PGW 2200 Softswitch is running on a separate machine, ensure that the Cisco PGW 2200 Softswitch machine can reach the IP address of the license server machine.

LIF BER

This alarm occurs when the Cisco PGW 2200 Softswitch detects an excessive bit error ratio from a frame alignment signal. Any source of electrical noise might cause this alarm; for example, a degraded transmission line, degraded line connectors, or a high-voltage electrical source that is located in proximity to a line.

Corrective Action

To correct the problem, isolate the source by testing the connections and transmission line for the identified component. When you have identified the source, resolve as necessary.

LIF FAIL

This alarm occurs when a local Ethernet interface fails.

Corrective Action

To correct the problem, perform the following steps:

Note If the Association Degraded or Association Failed alarms occur along with this alarm, follow the procedure that is defined in the "Resolving an Association Alarm" section on page 6-122.

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Use the Log viewer in the MGC Viewer toolkit to search the system log file from the same time period as this alarm for a GEN_ERR_IPINTF_FAIL log message.

Note For more information on using the Log viewer, see *Cisco PGW 2200 Softswitch Release 9 Operations, Maintenance, and Troubleshooting Guide*.

If you detect a GEN_ERR_IPINTF_FAIL log message, proceed to Step 3. Otherwise, proceed to Step 7.

Step 3 Identify the cause of the failure from the information in the log message.

If the cause in the log message is "Admin Down," the interface was taken down using an administrative command. Proceed to Step 4.

If the cause in the log message is "Link Down," the Ethernet path failed. Proceed to Step 5.

Step 4 Enter the **`ifconfig` *`interface`* `up`** UNIX command to restore the link to service:

Where:

interface—IP address of the affected interface.

If the interface is restored and is working fine, the procedure is complete. Otherwise, proceed to Step 7.

Step 5 Verify that the cable connected between the interface and the associated Ethernet switch is working properly.

If the cable is working correctly, proceed to Step 6.

If the cable is not working correctly, replace it. If replacing the cable resolves the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the associated Ethernet switch is working properly.

If the Ethernet switch is working correctly, proceed to Step 7.

If the Ethernet switch is not working correctly, troubleshoot the problem as indicated in the documentation for your switch. If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF LOF

This alarm occurs when a loss of T1/E1 framing is detected on the LIF. The physical line has a signal but lost the framing pattern.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the framing format used on the port matches the framing format that is used on the line.

If the framing formats are different, change the framing format on the port to the other framing format. Otherwise, proceed to Step 3. If the alarm does not clear, proceed to Step 3.

Step 3 Change the line build-out setting. If the alarm does not clear, proceed to Step 4.

Step 4 Open the statistics report for the port and look for evidence of a bad line. Bursts of Latvia could indicate a timing problem.

If you find evidence of a bad line, perform loopback tests on the line to isolate the problem. Otherwise, proceed to Step 5. Once you have isolated the problem, resolve as necessary. If the alarm does not clear, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF LOS

This alarm occurs when the sent signal is lost in the T1/E1. The receiving end does not receive the signal. The physical line might have a break in it.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the cable connections are correct between the interface port and the service provider equipment or T1/E1 terminal equipment.

If the cable was built on-site, check the cable connectors. A reversal of send and receive pairs or an open receive pair can cause this condition.

If the cable connections appear correct, then proceed to Step 3.

Step 3 Check your T1/E1 equipment, or ask your service provider to test your T1/E1 line and correct any errors found.

If the alarm does not clear, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF SES

This alarm occurs when the LIF is automatically set to the out-of-service state because of severely errored seconds. The TDM line has a large amount of noise, causing an error rate greater than 10–3. Framing and signal are within tolerance. This alarm indicates a degraded but functioning line.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the terminations and cabling for the LIF are working. If you can identify the source of the problem, resolve as necessary. Otherwise, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF YELLOW

This alarm occurs when the receiving end reports a loss of the sent signal. This alarm is reported for T1/E1 facilities only.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Connect an external loopback cable to the affected port.

If no alarms are produced, proceed to Step 3.

If alarms are produced, the port is causing the error. Replace the hardware component that is associated with the port. See the associated media gateway documentation for more information on replacing the component.

Step 3 Check for an open, short, or wiring error in the cable between the network interface port and your service provider network interface unit T1/E1 terminal equipment. An open send pair can cause this condition.

If you find a wiring problem, replace the cable. If that does not clear the alarm, proceed to Step 4.

If you do not find a wiring problem, then proceed to Step 4.

Step 4 If your port is configured to use D4 framing, the port might intermittently detect yellow alarms because the packet data might contain the pattern that is used to signal yellow alarm in D4 framing. If possible, switch to ESF framing in both the terminal equipment and the line equipment.

If switching the framing does not clear the alarm, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF: IDLE CHANGE

This alarm occurs when the physical line fails because its cable is broken or not plugged in. This alarm is reported for V.35 facilities only.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the V.35 cables between the port and the far-end are working correctly.

If you find a problem with a V.35 cable, replace the cable. If that does not correct the problem, proceed to Step 3.

If you do not find a problem with the V.35 cables, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF: LOST CD

This alarm occurs when the physical line has failed because its cable is broken or not plugged in. This is reported for V.35 facilities only.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the V.35 cables between the port and the far-end are working correctly.

If you find a problem with a V.35 cable, replace the cable. If that does not correct the problem, proceed to Step 3.

If you do not find a problem with the V.35 cables, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

LIF: LOST CTS

This alarm occurs when the physical line fails because its cable is broken or not plugged in. This is reported for V.35 facilities only.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the V.35 cables between the port and the far-end are working correctly.

If you find a problem with a V.35 cable, replace the cable. If that does not correct the problem, proceed to Step 3.

If you do not find a problem with the V.35 cables, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

M3UAKEY Ack Pending

This alarm occurs when the Cisco PGW 2200 Softswitch cannot send or receive traffic for the identified SS7 signaling service via the Cisco ITP that has not acknowledged the M3UAKEY.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for your Cisco ITP for more information.

Step 3 Retrieve the settings for the affected M3UA routing keys using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 The AS definitions should match the routing contexts of the M3UA routing keys. If they match, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the routing contexts of the M3UA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the routing contexts corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the AS is not shut down on the Cisco ITP. See the documentation for your Cisco ITP for more information. If the AS is shut down, restart it. Otherwise, proceed to Step 7.

If restarting the AS corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Note If you modify an ss7path that is configured for M3UAKEY, the system generates the "All M3UAKEY Ack Pending" alarm for all the other ss7paths that are configured with the same M3UAKEY, although they are not being modified.

Coincidentally, when you modify an ss7path, the system generates the M3UAKEY Ack Pending alarms when the **prov-cpy** and **prov-dply** commands are being processed. However, these alarms are cleared after the commands have been completed.

When the **prov-cpy** and **prov-dply** commands are being processed, no new calls can be placed on any of the ss7paths for which alarms were generated. However, the calls that already exist on the ss7paths are not affected.

MeterPulseTariff Table Load Failure

This alarm occurs when the Cisco PGW 2200 Softswitch fails to load the meter pulse tariff table.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify whether a tariff table is present on your system by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:metertariff:"all"** command:

The system responds with a list of elements in the meter pulse tariff table, or with an error message indicating that the meter pulse tariff table does not exist.

If the meter pulse tariff table is not present, provision a meter pulse tariff table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

If a meter pulse tariff table is present, verify that the information returned is correct. If the information is correct, proceed to Step 3. Otherwise, correct the contents of the meter pulse tariff table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide.*

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

MMDB: Database unavailable

This alarm occurs when the main memory database is unavailable to provide any services. The Cisco PGW 2200 Softswitch attempts to recover. The alarm clears when the database becomes available.

Corrective Action

To correct the problem, delete any unnecessary files from the Cisco PGW 2200 Softswitch, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

MMDB: Database cause switchover

This alarm occurs when the main memory database is unavailable on a redundant system and is indicating that the system should switchover. The Cisco PGW 2200 Softswitch attempts to recover. The alarm clears when the database becomes available.

Corrective Action

To correct the problem, delete any unnecessary files from the standby Cisco PGW 2200 Softswitch, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

MMDB: Database nearly full

This alarm occurs when the main memory database detects that allocated resources for data storage are nearly all utilized.

Corrective Action

To correct the problem, delete any unnecessary files from the Cisco PGW 2200 Softswitch, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

NAS: AuditResponse Failure

This alarm occurs when the identified media gateway fails to send a RESYNC RESP message back to the Cisco PGW 2200 Softswitch within the audit time interval.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the affected media gateway is in the in-service state, as described in the "Verifying the Status of all Signaling Services" section on page 3-9.

If the affected media gateway is in-service, proceed to Step 3. Otherwise, proceed to Step 4.

Step 3 Verify that the configuration of the affected media gateway is correct. See the documentation for the media gateway for more information.

If that does not resolve the problem, proceed to Step 4.

Step 4 Verify that the Ethernet interfaces between the Cisco PGW 2200 Softswitch and the associated media gateway are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of an Ethernet interface on the media gateway, see the documentation for the specific media gateway.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 5.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing an Ethernet interface card on the media gateway, see the documentation for the specific media gateway.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

NAS: CommsFailure

This alarm occurs when the Cisco PGW 2200 Softswitch cannot communicate with the identified media gateway.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine whether the affected media gateway is operating. See the documentation for the media gateway for more information.

If the affected media gateway is not operating, restore it to service. See the documentation for the media gateway for more information.

If the affected media gateway is operating, proceed to Step 3.

Step 3 Verify that the IP configuration parameters for the Cisco PGW 2200 Softswitch and the affected media gateway are correct.

Note Use the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69, to retrieve the IP configuration information for the Cisco PGW 2200 Softswitch. See the documentation for the media gateway for information on retrieving the IP configuration data.

If the configuration of the Cisco PGW 2200 Softswitch is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration of the affected media gateway is incorrect, modify the provisioning data for your system. See the documentation for the media gateway for more information.

If the configuration of both the Cisco PGW 2200 Softswitch and the affected media gateway are correct, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

NAS: ResourceFailure

This alarm occurs when the indicated media gateway does not acknowledge a continuity test (COT).

Corrective Action

To correct the problem, run a manual COT on the indicated media gateway, as described in the Running a Manual Continuity Test, page 6-149.

OLC: Leg1chanSeizedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Seized Channel (CRCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1chanModifiedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Modify Channel (MDCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1chanDeletedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Delete Channel (DLCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1notifyUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Notify (NTFY) message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1deleteChanUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Delete Channel (DLCX) message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1notifyRequestAckUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Request Notify (RQNT) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OLC: Leg1chanOpsFailed

This alarm occurs when the Cisco PGW 2200 Softswitch detects an internal error or a problem that is related to a media gateway.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OOS TRAFFIC RE-ROUTE

This alarm occurs when the traffic channels (bearer channels, IP network) on one side of the Cisco PGW 2200 Softswitch are lost, which causes the Cisco PGW 2200 Softswitch to reroute channels away from the affected component. Usually, this alarm is generally because of a network or equipment failure, but might be because of a provisioning failure.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 The Cisco PGW 2200 Softswitch should display the other alarms that are associated with the affected component. Resolve those alarms first.

If resolving those alarms does not clear this alarm, proceed to Step 3.

Step 3 Verify that the traffic channel settings that are provisioned for the Cisco PGW 2200 Softswitch and the affected media gateway are correct.

Note Use the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69, to retrieve the traffic channel provisioning data for the Cisco PGW 2200 Softswitch. See the documentation for the media gateway for information on retrieving the traffic channel data.

If the configuration of the Cisco PGW 2200 Softswitch is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration of the affected media gateway is incorrect, modify the provisioning data for your system. See the documentation for the media gateway for more information.

If the configuration of both the Cisco PGW 2200 Softswitch and the affected media gateway are correct, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

OverloadHeavy

This alarm occurs when the system reaches the threshold for overload level 3. The system performs an automatic switchover operation. If the call rejection percentage setting for overload level 3 is unchanged from its default value, the system rejects all new calls until the abate threshold for overload level 3 is reached. The system automatically clears the alarm at that time. For more information, see the "Managing Automatic Congestion Control" section on page 3-77.

Corrective Action

If a rare spike in traffic causes this alarm, corrective action is not necessary. If this alarm occurs regularly, you should ensure that your links and routes are properly configured for load sharing, as described in the "SS7 Load Sharing Malfunction" section on page 6-97, and reroute some of your traffic to other Cisco PGW 2200 Softswitches.

Note This alarm can occur when a provisioning session is active during peak busy hours. If this alarm occurs during a provisioning session, you might clear the alarm by stopping the provisioning session. For more information on the MML commands to manage a provisioning session, see the "Provisioning a Cisco PGW 2200 Softswitch" section on page 3-64.

OverloadMedium

This alarm occurs when the system reaches the threshold for overload level 2. The system rejects a percentage of new calls that are based on the call rejection percentage setting for overload level 2, until the system reaches the abate threshold for overload level 2. The system automatically clears this alarm at that time. For more information, see the "Managing Automatic Congestion Control" section on page 3-77.

Corrective Action

If a a rare spike in traffic causes this alarm, corrective action is not necessary. If this alarm occurs regularly, you should ensure that your links and routes are properly configured for load sharing, as described in the "SS7 Load Sharing Malfunction" section on page 6-97, and reroute some of your traffic to other Cisco PGW 2200 Softswitches.

Note This alarm can occur when a provisioning session is active during peak busy hours. If a provisioning session is active, you can clear the alarm by stopping the provisioning session. For more information on the MML commands to manage a provisioning session, see the "Provisioning a Cisco PGW 2200 Softswitch" section on page 3-64.

OverloadLight

This alarm occurs when the system reaches the threshold for overload level 1. The system rejects a percentage of new calls that are based on the call rejection percentage setting for overload level 1, until the abate threshold for overload level 1 is reached. The system automatically clears this alarm at that time. For more information, see the "Managing Automatic Congestion Control" section on page 3-77.

Corrective Action

If a rare spike in traffic causes this alarm, corrective action is not necessary. If this alarm occurs regularly, you should ensure that your links and routes are properly configured for load sharing, as described in the "SS7 Load Sharing Malfunction" section on page 6-97, and reroute traffic to other Cisco PGW 2200 Softswitches.

Note This alarm can occur when a provisioning session is active during peak busy hours. If a provisioning session is active, you might clear the alarm by stopping the provisioning session. For more information on the MML commands to manage a provisioning session, see the "Provisioning a Cisco PGW 2200 Softswitch" section on page 3-64.

OverResIncomingThreshold

This alarm occurs when the percentage of idle CICs in a trunk group is less than or equal to the configured threshold.

Corrective Action

This alarm might occur occasionally during periods of congestion. However, if this alarm occurs repeatedly, you might need to adjust the value of the parameter that controls the percentage of idle CICs for the affected trunk group. To modify the parameter, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.Retrieve the current settings for the affected trunk group using the **prov-rtrv:rttrnkgrp:name="trnkgrp_name"** command:

Where:

trnkgrp_name is the name of the affected trunk group.

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2002-09-20 15:38:02.892 EST
M  RTRV
   "session=NOA_SPAIN:rttrnkgrp"
   /*
name         type  reattempts  queuing  cutThrough  resIncomingPerc
----------   ----  ----------  -------  ----------  ----------
111          1     2           120      2           0
   */
```

The parameter, *ResIncomingPerc*, controls the percentage of idle CICs for the trunk group. In the preceding example, the value is 0.

Step 2 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 3 Use the **prov-ed** MML command to modify the setting of the resIncomingPerc parameter. For example, to change the percentage of idle CICs to 30 percent in a trunk group that is called 1000, enter the **prov-ed:rttrnkgrp:name="1000", resImcomingPerc="30"** command:

Note The new value for resIncomingPerc takes effect after your provisioning session is activated. Once the new value is activated, the OverResIncomingThreshold alarm is set or cleared after an outgoing call is routed over the affected trunk group.

Step 4 Save and activate the provisioning session, as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If the alarm clears, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

PC UNAVAIL

This alarm occurs when a destination point code (DPC) is unavailable. This alarm can occur if a network failure isolates the DPC; or, the alarm can occur if a local equipment failure causes a loss of connectivity. Also, the Cisco PGW 2200 Softswitch can raise the alarm if the DPC, or routes to the DPC, were configured improperly.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 The Cisco PGW 2200 Softswitch should also display other alarms that indicate problems with hardware, the SS7 links, or the network. Resolve those alarms first.

If resolving those alarms does not clear this alarm, proceed to Step 3.

Step 3 Ensure that the provisioning settings for the DPC and for all routes to the DPC and adjacent STPs match the settings that are used on the far-end, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the configuration data associated with the DPC is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration data associated with the DPC is correct, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Peer IP Links Failure

This alarm occurs when the IP links to the peer Cisco PGW 2200 Softswitch are removed or down.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Ethernet interfaces for the active and standby Cisco PGW 2200 Softswitches are working properly.

Note You can find information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch in the Sun Microsystems documentation that came with your system.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 3.

Note You can find information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch in the Sun Microsystems documentation that came with your system.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

PEER LINK A FAILURE

This alarm occurs either because a communication path between peer modules was lost or a peer module has stopped communicating.

Corrective Action

To correct the problem, perform the procedure in the "Resolving a Failed Connection to a Peer" section on page 6-181.

PEER LINK B FAILURE

This alarm occurs either because a communication path between peer modules was lost or a peer module has stopped communicating.

Corrective Action

To correct the problem, perform the procedure in the "Resolving a Failed Connection to a Peer" section on page 6-181.

PEER MODULE FAILURE

This alarm occurs when communications to a peer module are lost, indicating failure.

Corrective Action

To correct the problem, perform the procedure in the "Resolving a Failed Connection to a Peer" section on page 6-181.

POM INACTIVITY TIMEOUT

This alarm occurs when a provisioning session has been idle for 20 minutes. If there is no provisioning activity within the next 5 minutes, the system terminates the session.

Corrective Action

To correct the problem, enter some provisioning MML commands, or stop the provisioning session as described in the "Saving and Activating your Provisioning Changes" section on page 3-65. For more information about provisioning the Cisco PGW 2200 Softswitch, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

POM SESSION TERMINATE

This alarm occurs when a provisioning session is terminated. Any additional provisioning commands are not accepted.

Corrective Action

If you want to restart your provisioning session, perform the steps that are listed in the "Starting a Provisioning Session" section on page 3-64, using the same source version set equal to the destination version name.

POM: DynamicReconfiguration

This alarm occurs when a dynamic reconfiguration procedure is started. It is cleared once the dynamic reconfiguration is successfully completed. See the "Invoking Dynamic Reconfiguration" section on page 3-66 for more information.

Corrective Action

If necessary, you can complete the dynamic reconfiguration procedure, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

Note If you modify an ss7path that is configured for M3UAKEY, the system generates the "All M3UAKEY Ack Pending" alarm for all the other ss7paths that are configured with the same M3UAKEY, although they are not being modified.

Coincidentally, when you modify an ss7path, the system generates the M3UAKEY Ack Pending alarms when the **prov-cpy** and **prov-dply** commands are being processed. However, these alarms are cleared after the commands have been completed.

When the **prov-cpy** and **prov-dply** commands are being processed, no new calls can be placed on any of the ss7paths for which alarms were generated. However, the calls that already exist on the ss7paths are not affected.

POM: PEER_SYNC_ERR

This alarm occurs when the standby Cisco PGW 2200 Softswitch attempts to synchronize the contents of its configuration library while a provisioning session is in progress on the active Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, either stop the provisioning session as described in the "Ending a Provisioning Session Without Activating your Changes" section on page 3-66. Alternatively, you can save and activate your changes according to the method described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

PRI: B-Channel not available

This alarm occurs when the Cisco PGW 2200 Softswitch receives a PRI "setup" message and the requested B channel is not available or cannot be allocated to the call.

Corrective Action

If necessary, you can save and activate a provisioning session, as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

ProcM No Response

The process manager is not responding to state information changes from the failover daemon.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Stop the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 3 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 4 Perform a manual switchover, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 5 Stop the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 6 Restart the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If restarting the software does not resolve the problem, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

ProtocolFileMissing

This alarm occurs when the protocol files associated with your system configuration have not been installed.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Search the active system log file, as described in the "Viewing System Logs" section on page 6-90, for logs that indicate that a *.mdo or *.so file cannot be found.

If there are logs that indicate that a *.mdo or *.so file cannot be found, proceed to Step 3.

If there are no logs that indicate that an IPC file cannot be opened, proceed to Step 5.

Step 3 Determine which protocol patch contains the missing file. To find the patch that contains the missing file, consult the Release Notes for your particular release of the Cisco PGW 2200 Softswitch software.

Step 4 When you determine the protocol patch that contains your missing files, go to the following URL to down load this patch for your version of the Cisco PGW 2200 Softswitch software:

http://www.cisco.com/kobayashi/sw-center/sw-voice.shmtl

Step 5 Install the patch as instructed in its associated text file.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

REPL: all connections failure

This alarm occurs when the Cisco PGW 2200 Softswitch cannot establish communication to the peer Cisco PGW 2200 Softswitch.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the Ethernet interfaces for the Cisco PGW 2200 Softswitch are working properly.

Note For information on verifying the proper operation of an Ethernet interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system.

If an element of the Ethernet connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 3.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system.

Step 3 Verify the replicator configuration on the Cisco PGW 2200 Softswitches, as described in the "Restoring a Backup File from a Device" section on page 6-178.

If that does not resolve the alarm, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

RSET CONFIG FAIL

This alarm occurs when the provisioning data for the SS7 route that is set to a DPC has invalid or incompatible parameter values. This alarm does not occur because of a mismatch between the network topology and the DPC data.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Ensure that the provisioning settings for the DPC and for all routes to the DPC match the settings that are used on the far-end, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the configuration data associated with the DPC is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration data associated with the DPC is correct, then proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SC CONFIG FAIL

This alarm occurs when the provisioning parameters for the data link layer of a signaling channel are inconsistent or invalid. The signaling channel might already be provisioned. The configuration file might be corrupted so that the Cisco PGW 2200 Softswitch cannot read it.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Place the affected signaling channel in the out-of-service state.

Step 3 Start a provisioning session, as described in the "Starting a Provisioning Session" section on page 3-64.

Step 4 Remove the affected signaling channel from your configuration using the **prov-dlt** MML command. See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for more information.

Step 5 While referring to your local provisioning parameters, reprovision the signaling channel using the **prov-add** MML command. See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for more information.

Step 6 Save and activate the provisioning session, as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 7 Place the signaling channel in the in-service state.

If placing the signaling channel in-service does not resolve the problem, proceed to Step 8.

Step 8 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SC FAIL

This alarm occurs when the signaling channel is down and unable to process traffic. As a result, the signaling channel fails to negotiate a D-channel session, automatic restarts cannot recover the session, and the data link-layer fails. This problem can occur when SS7 SLTM/SLTA fails or when a PRI D-channel fails.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Ensure that the near-end and far-end data link terminations are operating.

If the near-end or far-end data link terminations are not operating, fix as necessary.

If the near-end and far-end data link terminations are operating, proceed to Step 3.

Step 3 Ensure that the provisioning settings for the signaling channel match the settings that are used on the far-end, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the configuration data for the signaling channel is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration data for the signaling channel is correct, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SC M-OOS

This alarm occurs when a signaling channel has been taken out of service manually.

Corrective Action

To correct the problem, restore the affected signaling channel to the in-service state, using the appropriate procedure. Procedures for modifying the state of signaling channels are described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105, the "Setting the Service State of an IP Link" section on page 6-105, and the "Setting the Service State of a D-channel" section on page 6-106.

SG Node Interface Fail

This alarm occurs when all IP connections to a signaling gateway (SG) node are out of service.

Corrective Action

To correct the problem, check the configuration of the SG node and, if necessary, configure it to connect to the Cisco PGW 2200 Softswitch.

SG Pair Interface Fail

This alarm occurs when all IP connections to both SGs of a pair or a single nonpaired SG are out of service.

Corrective Action

To correct the problem, check the configuration of the affected SG and, if necessary, configure it to connect to the peer SG.

SIP: DNS CACHE NEARLY FULL

This alarm occurs when the domain name service (DNS) cache is nearly full.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Retrieve the current DNS properties by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:dnsparam:"all"** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 1999-12-30 14:27:48
M  RTRV
"session=test:dnsparam"
/*
*.DnsCacheSize = 500
*.DnsKeepAlive = 30
*.DnsPolicy = HIERARCHY
*.DnsQueryTimeout = 1000
*.DnsServer1 = 172.22.1.1
*.DnsServer2 = 143.83.1.1
*DnsTTL = 3600
*/
```

Make note of the value of the *.DnsCacheSize parameter.

Step 3 Begin a dynamic reconfiguration session to increase the value of the *.DnsCacheSize parameter, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If this alarm occurs repeatedly despite increasing the size of the cache, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SIP: DNS SERVICE OOS

This alarm occurs when the DNS servers do not respond to queries. The DNS servers might be out of service or access to them might be lost.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Retrieve the current DNS properties by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:dnsparam:"all"** command:

The system returns a response like the following:

```
MGC-01 - Media Gateway Controller 1999-12-30 14:27:48
M  RTRV
"session=test:dnsparam"
/*
*.DnsCacheSize = 500
*.DnsKeepAlive = 30
*.DnsPolicy = HIERARCHY
*.DnsQueryTimeout = 1000
*.DnsServer1 = 172.22.1.1
*.DnsServer2 = 143.83.1.1
*DnsTTL = 3600
*/
```

Note the value of the *.DnsServer1 and *.DnsServer2 parameters.

Step 3 Begin a dynamic reconfiguration session to select new DNS servers for your system, entering their IP addresses in the *.DnsServer1 and *.DnsServer2 parameters, using the procedure that is described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If this alarm occurs repeatedly despite selecting new DNS servers, then proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SIP: OOS

This alarm occurs when an IP link used by the SIP is out of service.

Corrective Action

To correct the problem, attempt to restore the IP link to service using the procedure that is described in the "Setting the Service State of an IP Link" section on page 6-105.

SIP Service Fail Over

This alarm occurs in response to the failure of switch interfaces, because of either a physical failure or an administrative shutdown.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine whether a physical failure or an administrative shutdown caused the alarm.

If a physical failure caused the alarm, proceed to Step 3.

If an administrative shutdown caused the alarm, check for this alarm again once the interface has been restored. If this alarm is still active, proceed to Step 4.

Step 3 Verify that the switch interfaces between the Cisco PGW 2200 Softswitch and the affected SIP element are working properly.

Note For information on verifying the proper operation of a switch interface on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on verifying the proper functioning of a switch interface on other devices, see the documentation that came with the particular device.

If an element of the switch connection (such as a cable or an Ethernet interface card) is not working properly, replace it. Otherwise, proceed to Step 4.

Note For information on removing and replacing an Ethernet interface card on the Cisco PGW 2200 Softswitch, see the Sun Microsystems documentation that came with your system. For information on removing and replacing components on other devices, see the documentation can that came with the particular device.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Standby Warm Start

This alarm occurs on the active Cisco PGW 2200 Softswitch when a synchronization operation between the active and standby Cisco PGW 2200 Softswitches begins. This alarm clears automatically when the synchronization operation finishes. This alarm also occurs on the standby Cisco PGW 2200 Softswitch when the **prov-sync** MML command is entered on the active Cisco PGW 2200 Softswitch. In that case, the alarm clears automatically when the synchronization of provisioning data is complete. If a synchronization operation fails, the system clears this alarm automatically and generates a FAIL REMOTE STANDBY alarm. See the "FAIL REMOTE STANDBY" section on page 6-42 for more information.

Corrective Action

Corrective action is only required when the alarm does not clear automatically. If this alarm does not clear automatically, verify that the pom.dataSync parameter in the XECfgParm.dat is set to *true* on each host, using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

SS7 RTE KEY FAIL

This alarm occurs when one or more routing keys for an SS7 signaling service that is associated with an SG has failed; the signaling service cannot receive some ISUP messages. The maximum number of routing keys that the associated SG supports might have been exceeded.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Ensure that the provisioning settings for the bearer channels that are associated with this SG are correct by using the procedure that is described in the "Retrieving Provisioning Data" section on page 3-69.

If the configuration data associated with the bearer channels is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66. If reconfiguration clears the alarm, the procedure is complete. Otherwise, proceed to Step 3.

If the configuration data associated with the bearer channels is correct, then proceed to Step 4.

Step 3 Determine the maximum number of dynamic routing keys that are allowed on the associated SG.

Step 4 Determine how many routing keys the Cisco PGW 2200 Softswitch is using for the affected SG by adding the number of CICs associated with the SS7 signaling service (ss7sgpath) and the number of SS7 subsystems (ss7sgsubsys).

For example, if 990 CICs and 10 SS7 subsystems were associated with the SG, then the Cisco PGW 2200 Softswitch would be using 1000 routing keys.

Step 5 Compare the maximum number of routing keys that are allowed to the number of routing keys being used. If the number of routing keys being used is greater, proceed to Step 6. Otherwise, proceed to Step 7.

Step 6 Begin a dynamic reconfiguration session to delete the excess routing keys by removing either CICs or SS7 subsystems from your configuration, using the procedure that is described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If deleting excess routing keys clears the alarm, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SS7 SIG SRVC CONFIG FAIL

This alarm occurs when the identified SS7 signaling service that is associated with an SG is not configured correctly.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Retrieve the current DNS properties by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:ss7SGPath:name="sig_srv"** command:

Where:

sig_srv is the MML name of the identified SS7 signaling service.

The system returns a response that lists all the properties that are associated with the selected SS7 signaling service.

Step 3 Verify that the information displayed for the SS7 signaling service is correct.

If it is correct, proceed to Step 4. Otherwise, proceed to Step 5.

Step 4 Begin a dynamic reconfiguration session to correct the settings for the SS7 signaling service by using the procedure that is described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If correcting the settings for the SS7 signaling service clears the alarm, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SS7 SIG SRVC UNAVAIL

The identified SS7 signaling service is unavailable.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform the MML command **rtrv-dest** on the SS7PATH or SS7SUBSYS object.

If the state is OOS,FLD, the signaling service is out of service because of failure of the MTP3 transport. Enter the MML command a **prov-rtrv:***SS7PATH* or a **prov-rtrv:***SS7SUBSYS* on the signaling service object.

a. If the object has an OPC attribute defined, the signaling service is using Cisco ITP-Ls for SS7 communication. The MTP3 layer is on the Cisco PGW 2200 Softswitch. Examine the SS7ROUTEs and LINKSETs to determine the cause of the failure.

b. If the object does not have an OPC attribute defined, the signaling service is using ITPs for SS7 communication. The MTP3 layer is one of the ITPs. Examine the M3UAROUTEs that have the same OPC and DPC as SS7PATH or the SUAROUTEs that have the same OPC, APC, and REMOTE SSN to determine which ITP EXTNODEs the signaling service uses. Consult the ITP documentation and debug the problem on the ITPs.

If the state is OOS, FLD&UPU, the signaling service is out of service because of failure of the user part layer at the destination. Examine the remote destination to determine the cause of the failure.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Note If you modify an ss7path that is configured for M3UAKEY, the system generates the "All M3UAKEY Ack Pending" alarm for all the other ss7paths that are configured with the same M3UAKEY, although they are not being modified.

Coincidentally, when you modify an ss7path, the system generates the M3UAKEY Ack Pending alarms when the **prov-cpy** and **prov-dply** commands are being processed. However, these alarms are cleared after the commands have been completed.

When the **prov-cpy** and **prov-dply** commands are being processed, no new calls can be placed on any of the ss7paths for which alarms were generated. However, the calls that already exist on the ss7paths are not affected.

SSN FAIL

This alarm occurs when the SCP located by the subsystem number (SSN) is not available.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Ensure that the provisioning settings for the SSN and the associated routes match the settings that are used on the far-end, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the configuration data associated with the SSN is incorrect, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the configuration data associated with the SSN is correct, proceed to Step 3.

Step 3 Verify the network configuration to confirm that the SCP identified with the SSN is reachable.

If the SCP is not reachable, begin a dynamic reconfiguration session, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66. Reprovision your data for an SCP that is reachable or remove the SSN and its associated data.

If the SCP is reachable, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SUAKEY Ack Pending

This alarm occurs when the Cisco PGW 2200 Softswitch cannot send or receive traffic for the identified SS7 subsystem via the Cisco ITP that has not acknowledged the SUAKEY.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine the AS definitions on the associated Cisco ITP. See the documentation for your Cisco ITP for more information.

Step 3 Retrieve the settings for the affected SUA routing keys using the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

Step 4 The AS definitions should match the routing contexts of the SUA routing keys. If they match, proceed to Step 6. Otherwise, proceed to Step 5.

Step 5 Open a dynamic reconfiguration session to modify the routing contexts of the M3UA routing keys, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If modifying the routing contexts of the M3UA routing keys corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the AS is not shut down on the Cisco ITP. See the documentation for your Cisco ITP for more information. If the AS is shut down, restart it. Otherwise, proceed to Step 7.

If restarting the AS corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SUPPORT FAILED

This alarm occurs when the identified entity cannot provide service because a supporting entity is not providing service. The supporting entity might be hardware or software.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Check for other alarms, as described in the "Retrieving All Active Alarms" section on page 6-3, which further identify the failed entity.

Step 3 After you have identified the failed entity, replace it and restore it to service. If the entity is hardware, see the appropriate documentation for replacement. If it is software, attempt to reboot the software.

If the alarms clear, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SwitchoverFail

This alarm occurs when a switchover operation from the active Cisco PGW 2200 Softswitch to the standby Cisco PGW 2200 Softswitch fails.

Corrective Action

To correct the problem, perform the procedure described in the "Recovering from a Switchover Failure" section on page 6-170.

Tariff Table Access Failure

This alarm occurs when the Cisco PGW 2200 Softswitch could not access the tariff table.

Corrective Action

To correct the problem, check for the presence of the Tariff Table Load Failure alarm, by using the procedure described in the "Retrieving All Active Alarms" section on page 6-3. If this alarm is present, perform the corrective action for that alarm. Otherwise, the procedure is complete.

Tariff Table Load Failure

This alarm occurs when a Cisco PGW 2200 Softswitch process is unable to load the tariff table.

Corrective Action

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify whether a tariff table is present on your system by logging in to your active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:tariff:"all"** command:

The system responds with a list of elements in the tariff table, or with an error indicating that a tariff table does not exist.

If a tariff table is not present, provision a tariff table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

If a tariff table is present, verify that the information returned is correct. If the information is correct, proceed to Step 3. Otherwise, correct the contents of the tariff table, as described in *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2chanSeizedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Seize Channel (CRCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2chanModifiedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Modify Channel (MDCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2chanDeletedUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Delete Channel (DLCX) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2notifyUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Notify (NTFY) message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2deleteChanUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Delete Channel (DLCX) message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2notifyRequestAckUnpackError

This alarm occurs when the Cisco PGW 2200 Softswitch receives a Request Notify (RQNT) acknowledge message from the media gateway, which could not be unpacked.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

TLC: Leg2chanOpFailed

This alarm occurs when the Cisco PGW 2200 Softswitch detects an internal error or a problem that is related to a media gateway.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a call trace, as described in the "Performing a Call Trace" section on page 6-156.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

UCM: CCodeModfailed

This alarm occurs when the Cisco PGW 2200 Softswitch could not apply or remove a country code prefix.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine whether the country code prefix could not be applied or removed by viewing the active system log file. Use the procedure that is described in the "Viewing System Logs" section on page 6-90. A log should be present that uses the same text as the alarm. The log indicates whether the country code prefix could not be applied or removed and lists the affected B-number.

Step 3 Determine whether country code prefix application or removal should be performed for the affected B-number.

If country code prefix processing should not be performed, proceed to Step 4.

If country code prefix processing should be performed, proceed to Step 8.

Step 4 Verify whether the result set associated with the affected B-number has a result type of CC_DIG configured. Use the **numan-rtrv** MML command that is shown in the following example:

```
numan-rtrv:resulttable:custgrpid=T002
```

If the result set does have a result type of CC_DIG configured, enter the **numan-dlt** MML command to remove the CC_DIG result set as shown in the following example:

```
numan-dlt:resulttable:custgrpid="T002", name="result46", resulttype="CC_DIG"
```

Otherwise, proceed to Step 5.

Step 5 Verify that the BDigitCCPrefix property for the associated trunk group is set to 0 (disabled) by issuing the **prov-rtrv** MML command that is shown in the following example:

```
prov-rtrv:trnkgrpprop:name="trnkgrp1"
```

If the BDigitCCPrefix property in the associated trunk group is not set to 0, enter the **prov-ed** MML command to modify the value of the property as shown in the following example:

```
prov-ed:trnkgrp:name="trnkgrp1", BDigitCCPrefix=0
```

Otherwise, proceed to Step 6.

Step 6 Verify that the BDigitCCrm property for the associated trunk group is set to NULL (disabled). Enter the **prov-rtrv** MML command that is shown in the following example:

```
prov-rtrv:trnkgrpprop:name="trnkgrp1"
```

If the BDigitCCrm property in the associated trunk group is not set to NULL, enter the **prov-ed** MML command to modify the value of the property as shown in the following example:

```
prov-ed:trnkgrp:name="trnkgrp1", BDigitCCrm=null
```

Otherwise, proceed to Step 7.

Step 7 Verify that the associated B-number analysis configuration does not allow for country code digit removal. Enter the **numan-rtrv** MML command that is shown in the following example:

```
numan-rtrv:digmodstring:custgrpid="T002"
```

If the associated B-number analysis configuration allows country code digit removal, enter the **numan-dlt** MML command to remove the digit string as shown in the following example:

```
numan-dlt:digmodstring:custgrpid="T002", name="ccspain"
```

Otherwise, proceed to Step 13.

Step 8 Select a step that is based on the country code prefix information that is found in the log identified in Step 2.

If the log indicates that the country code prefix could not be applied, proceed to Step 9.

If the log indicates that the country code prefix could not be removed, proceed to Step 11.

Step 9 Verify whether the result set associated with the affected B-number has a result type of CC_DIG configured by issuing the **numan-rtrv** MML command.

If the result set does not have a result type of CC_DIG configured, enter the **numan-ed** MML command to add the CC_DIG result set as shown in the following example:

```
numan-ed:resulttable:custgrpid="T002", name="result46", resulttype="CC_DIG", dw1=ccspain,
setname="setname1"
```

Otherwise, proceed to Step 10.

Step 10 Verify that the BDigitCCPrefix property for the associated trunk group is set to 1 (enabled). Enter the **prov-rtrv** MML command that is shown in the following example:

```
prov-rtrv:trnkgrpprop:name="trnkgrp1"
```

If the BDigitCCPrefix property in the associated trunk group is not set to 1, enter the **prov-ed** MML command to modify the value of the property as shown in the following example:

```
prov-ed:trnkgrp:name="trnkgrp1", BDigitCCPrefix=1
```

Otherwise, proceed to Step 13.

Step 11 Verify that the BDigitCCrm property for the associated trunk group is set to the correct number string. Enter the **prov-rtrv** MML command that is shown in the following example:

```
prov-rtrv:trnkgrpprop:name="trnkgrp1"
```

If the BDigitCCrm property in the associated trunk group is not set to the correct number string, enter the **prov-ed** MML command to modify the value of the property as shown in the following example:

```
prov-ed:trnkgrp:name="trnkgrp1", BDigitCCrm=34
```

Otherwise, proceed to Step 12.

Step 12 Verify that the associated B-number analysis configuration allows removal of a country code digit. Enter the numan-rtrv MML command that is shown in the following example:

```
numan-rtrv:digmodstring:custgrpid="T002"
```

If the associated B-number analysis configuration does not allow removal of a for country code digit, enter the **numan-ed** MML command to modify of the setting as shown in the following example:

```
numan-ed:digmodstring:custgrpid="T002", name="ccspain", digstring="34"
```

Otherwise, proceed to Step 13.

Step 13 Verify that the dial plan file was loaded correctly by using the procedure that is described in "Verifying Proper Loading of a Dial Plan" section on page 6-121.

If the dial plan was loaded correctly, the procedure is finished. Otherwise, proceed to Step 14.

Step 14 Perform a call trace, as described in "Performing a Call Trace" section on page 6-156.

Step 15 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

UCM: MGCPDIALAuthFail

This alarm occurs when an MGCP dial call fails after an automatic switchover, because of the expiration of a timer waiting for a Notify message from the associated media gateway.

Note This alarm is valid as of Release 9.3(1). There is a patch for Release 9.3(2) that retires this alarm.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify the configuration of the associated media gateway. If there are no configuration problems, proceed to Step 3. Otherwise, fix the identified configuration problems.

Step 3 Verify that the IP path between the media gateway and the Cisco PGW 2200 Softswitch is working properly. If you find no problems in the IP path between the media gateway and the Cisco PGW 2200 Softswitch, proceed to Step 4. Otherwise, fix the identified IP path problems.

Step 4 Verify that the IP path between the media gateway and the authentication server is working properly. If you find no problems in the IP path between the media gateway and the authentication, proceed to Step 5. Otherwise, fix the identified IP path problems.

Step 5 Verify that the authentication server is working properly. If you find no problems in the authentication server, proceed to Step 6. Otherwise, fix the identified problems in the authentication server.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Virtual_IP_Addr Mismatch

This alarm occurs when the virtual IP addresses configured in XECfgParm.dat files on the active and the standby Cisco PGW 2200 Softswitch do not match.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify the value that is set for the XECfgParm.dat parameter, *.Virtual_IP_Addr, on the active Cisco PGW 2200 Softswitch.

Step 3 Verify the value that is set for the XECfgParm.dat parameter, *.Virtual_IP_Addr, on the standby Cisco PGW 2200 Softswitch.

If the parameter values match, proceed to Step 10. Otherwise, proceed to Step 4.

Step 4 Log in to the standby Cisco PGW 2200 Softswitch and change directories to the /etc subdirectory by entering the **cd /opt/CiscoMGC/etc** UNIX command:

Step 5 Open the XECfgParm.dat file by using a text editor, such as vi.

Step 6 Set the value of the *.Virtual_IP_Addr parameter to match the value on the active Cisco PGW 2200 Softswitch.

Step 7 Save the changes and close the text editor.

Step 8 Stop the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 9 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If that resolves the problem, the procedure is complete. Otherwise, proceed to Step 10.

Step 10 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Wrong IP Path

This alarm occurs when an IP route or local interface that is associated with the identified component cannot be used. The system can raise this alarm when one of the following occurs:

- Another route in the operating system routing table overrides the affected route.
- Someone deletes a route that is configured on your system by issuing the **route delete** UNIX command.
- An IP link or route has been provisioned incorrectly.
- This alarm can also occur if an IP signaling channel is misconfigured. Enter the **netstat -rnv** UNIX command to retrieve the current operating system routing table.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch and retrieve the current operating system routing table by issuing the **netstat -rnv** UNIX command:

The system returns a response like the following:

```
IRE Table: IPv4
  Destination         Mask            Gateway     Device Flags
----------------- ---------------- -------------- ------ -----
10.82.80.0        255.255.255.0    10.82.82.1            UGH
10.82.81.0        255.255.255.0    10.82.83.1            UGH
10.82.82.0        255.255.255.0    10.82.82.112   hme0   U
10.82.83.0        255.255.255.0    10.82.83.112   hme1   U
default           0.0.0.0          10.82.82.1            UG
224.0.0.0         240.0.0.0        10.82.82.112   hme0   U
127.0.0.1         255.255.255.255  127.0.0.1      lo0    UH
```

Step 3 If the response does *not* contain the route that is identified in the alarm, open the operating system routing table file by using a text editor such as vi. Otherwise, proceed to Step 6.

Step 4 Add the route to the routing table by using the appropriate text editor command.

Step 5 Save the file and exit the editing session. If adding the route to the routing table resolves the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Verify that the provisioned settings for the identified IP link are correct. Enter the **prov-rtrv** MML command, as described in the "Retrieving Provisioning Data" section on page 3-69.

If the provisioned settings for the IP link are correct, proceed to Step 8.

If the provisioned settings for the IP link are incorrect, proceed to Step 7.

Step 7 Start a dynamic reconfiguration session to change the settings, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66. If changing the IP link settings resolves the problem, the procedure is complete. Otherwise, proceed to Step 8.

Step 8 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

XE Rsrc Fail

This alarm occurs when memory resources have been exhausted on the active Cisco PGW 2200 Softswitch. If this alarm occurs frequently, you might need to add additional memory to the Cisco PGW 2200 Softswitch. See the Sun Microsystems documentation for your Cisco PGW 2200 Softswitch for more information about adding additional memory.

Corrective Action

To correct the problem, perform the following steps:

Step 1 To collect system data, see the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a manual switchover, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately 3 seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 3 Stop the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 4 Restart the Cisco PGW 2200 Softswitch software on the newly standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If restarting the software resolves the problem, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Troubleshooting with System Logs

You can review system logs in conjunction with alarms to obtain vital information, which you can use to troubleshoot problems. The *Cisco PGW 2200 Softswitch Release 9 Messages Reference* provides a complete list of system logs.

The active system log files reside in the /opt/CiscoMGC/var/log directory. These system log files are archived based on the criteria that are set in the dmprSink.dat file. For more information on the dmprSink.dat file, see the "Configuring the Data Dumper" section on page A-2.

Note You can control log levels and destinations by modifying settings in the XECfgParm.dat file. See *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide* for more information.

Viewing System Logs

The log viewer, which is part of the Cisco MGC viewer toolkit, is the best tool for viewing logs. The log viewer enables you to search for specific log information, accounts for log rotations, and makes new logs available. The log server is responsible for log rotation. The log server closes the current file, and creates a new file for current logging. The log viewer also has an option for exporting the results of a log file search to a UNIX file.

For more information on using the log viewer, see the "Using the Log Viewer" section on page 3-128.

To view a log file when the Cisco MGC viewer toolkit is not installed on your system, complete the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch. Enter the **cd /opt/CiscoMGC/var/log** UNIX command to change to the /opt/CiscoMGC/var/log directory.

Step 2 Enter the **ls** UNIX command to list the available logs:

The system returns a response like the following:

```
alm.csv                        platform.log
cdr.bin                        platform_20010516141831.log
meas.csv                       platform_20010517040508.log
mml.log                        platform_20010518040508.log
mml_20010516141831.log         platform_20010519040508.log
mml_20010517040508.log         platform_20010520040508.log
mml_20010518040508.log         platform_20010521040508.log
```

Step 3 To view a specific system log file, enter the **cat *log_file_name* | more** command:

Where:

log_file_name—Name of the log file you want to view.

Note Because the log files are very large, use the more parameter to scroll through the file. You might prefer to print the file to find the information you need.

For example, enter the **cat platform_20010516141831.log | more** command to view a specific platform log file:

The system returns a response like the following:

```
Tue May  8 13:35:32:920 2001 EST | cdrDmpr (PID 15526) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility *

Tue May  8 13:35:32:921 2001 EST | cdrDmpr (PID 15526) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility *

Tue May  8 13:35:32:922 2001 EST | cdrDmpr (PID 15526) <Error>
GEN_ERR_GETCFGPARM: cdrDmprSink::readObj: Failed to get MGC_CDR_NODE_ID for facility
*Process id is 15517 and thead id is 1 in set the destination

Tue May  8 13:37:13:201 2001 EST | unknown (PID 15663) <Info>
/tmp/almM_input: installed time handler, hdlrId = 1

Tue May  8 13:37:31:786 2001 EST | engine (PID 15590) <Error>
CP_ERR_START_GWAY_AUDIT: engProcEvtHdlr::handleGoActiveLocal Failed to start GWAY
auditProcess id is 15508 and thead id is 1 in set the destination
Process id is 15509 and thead id is 1 in set the destination

--More--
```

Understanding System Log Messages

Each system log message conforms to the following format:

```
Timestamp, Process Name, Process ID, <Log Level>, Log ID:<Message Text>
```

- Timestamp—Displays the date and time on the system when the log message was created, for example, “May 8 01:35:23:047 2001 EST”. The time that is displayed is presented to the millisecond level.
- Process Name—Displays the name of the process that created the log message, for example, “engine”.
- Process ID—Displays the identification number of the process that created the log message, for example, “(PID29974)”.
- Log Level—Displays the severity level of the log message, for example, “Info”.
- Log ID—Displays a short, symbolic name for the message, for example, “GEN_ERR_GETCFGPARM:”.
- Message Text—Displays the log message text, for example, “installed time handler, hdlrId = 1”. Typically, the message text requires only a single line, but the text can extend to multiple lines.

Changing the Log Level for Processes

To control the types of log messages that are written to the system log file, use the **set-log** MML command to change the logging level for system processes. The Cisco PGW 2200 Softswitch can generate many logged events, which can result in large numbers of archived system log files in the opt/CiscoMGC/var/spool directory. For example, if the maxTime parameter in the dmprSink.dat file is set to 15 minutes, the Cisco PGW 2200 Softswitch creates over 2000 files in the opt/CiscoMGC/var/spool directory daily. Therefore, you might want to limit the number of logs that are created by changing the logging level of the Cisco PGW 2200 Softswitch software processes.

Table 6-1 lists the logging levels that you can select for the Cisco PGW 2200 Softswitch software processes without severely degrading system performance.

Table 6-1 Processes and their Lowest Possible Logging Levels

Process	Lowest Logging Level Without Severe Performance Degradation
Engine	Informational (the debug level causes major performance impacts—do not set).
All others	Debug, but only a single process can be in debug at any time.

Caution Debug level logging provides extremely verbose output and, if misused, can cause severe system performance degradation.

To change the log level of a single process, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-log:*process_name*:*log_level*,[*confirm*]** command.

Where:

- *process_name*—Name of the process for which you want to change the logging level. Processes are listed in the "Understanding Processes" section on page 3-5.
- *log_level*—Desired logging level. The valid log levels are as follows:
  - CRIT—Critical level messages
  - WARN—Warning condition messages
  - ERR—Error condition messages
  - TRACE—Trace messages
  - INFO—Informational messages
  - DEBUG—Debug-level messages (lowest level). Do not set the process to this logging level unless directed to do so by the Cisco Technical Assistance Center (TAC).
- confirm—Used when changing the logging level of a process to debug (DEBUG).

Note When you set a log level, the system also generates information for all levels above the level that you select. That is, if you set a process to the INFO log level, the system also displays information for the TRACE, ERR, WARN, and CRIT levels. The order of the log levels also constitutes levels of verbosity. For instance, the CRIT level generates the least information; the DEBUG level generates the most information.

For example, to change the log level of the engine, enter the **set-log:eng-01:info** command.

To change the log level of all processes, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-log:all:*log_level*** command.

Where:

log_level—Desired logging level. The valid log levels are as follows:

- CRIT—Critical level messages
- WARN—Warning condition messages
- ERR—Error condition messages
- TRACE—Trace messages
- INFO—Informational messages

Note When you set a log level, the system also generates information for all levels above the level that you select. That is, if you set a process to the INFO log level, the system also displays information for the TRACE, ERR, WARN, and CRIT levels. The order of the log levels also constitutes levels of verbosity. For instance, the CRIT level generates the least information; the DEBUG level generates the most information.

For example, to change the log level of all processes to warning, enter the **set-log:all:warn** command.

Note You cannot set the logging level of the process manager (PM-01) by issuing the **set-log:all:***log_level* MML command. You can change the logging level of the process manager only by issuing the **set-log:pm-01:***log_level* MML command.

Note You cannot enter the **set-log:all:***log_level* MML command to set all of the processes to the debug (DEBUG) logging level.

Note The disk monitor (DSKM-01) process does not accept log-level change requests.

Creating a Diagnostics Log File

You can create a diagnostics log file that records the MML commands and responses that you execute. To create a diagnostics log file, perform the following steps:

Step 1 Create a diagnostics log file by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **diaglog:*filename*:start** command.

Where:

filename is the name of the diagnostics log file. Enter the name only, do not enter a suffix, such as .log.

Step 2 Perform your troubleshooting procedures.

Step 3 When you have finished troubleshooting and you want to view your diagnostics file, enter the **diaglog:*filename*:stop** command at the active Cisco PGW 2200 Softswitch.

You can find the file, which is given the name that you entered in Step 1, without a suffix, in the $BASEDIR/var/log directory. You can view the file using a text editor, such as vi.

Collecting System Data for Cisco TAC

Cisco PGW 2200 Softswitch software has a data collection script. When you run this script, the Cisco PGW 2200 Softswitch saves a data snapshot of the system in a log file. You should run this script shortly after you discover a problem, and before taking any corrective action.

This script collects the following information in the log file:

- System name
- System boot messages
- Operating system patch level
- System patch level
- Processor information
- Disk usage
- Processor tables

- CPU utilization
- Number of users that are logged in
- Statistics for the Ethernet interfaces
- IP routing
- System setup
- Swap space
- Date and time of last system reboot
- Permissions for the configuration library (CONFIG_LIB)
- File permissions for the /opt/CiscoMGC/etc and /opt/CiscoMGC/bin directories
- Copy of the XECfgParm.dat file

To collect your system data snapshot, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, and enter the **cd /opt/CiscoMGC/local** UNIX command to change directories.

Step 2 Enter the **collectdata** command to run the system data snapshot script:

The system returns a response that indicates the name of the file and the data path to the file.

Note The name of the log file contains the time stamp when the file was created and the name of the Cisco PGW 2200 Softswitch. The file is always saved to the opt/CiscoMGC/var/log directory.

Step 3 Provide the log file to the Cisco TAC as instructed by TAC personnel.

Resolving SS7 Network Related Problems

The Cisco PGW 2200 Softswitch platform is a standard Service Switching Point (SSP) in an SS7 network. The SS7 network carries two types of signals:

- Circuit-related
- Noncircuit-related

The signals that are involved in the setup and teardown of bearer circuits are circuit-related. The Cisco PGW 2200 Softswitch uses non-circuit-related signals for all the ancillary services that the SS7 network provides, including database access and network management.

The SS7 protocol is composed of several levels or parts, including the following:

- Message Transfer Part (MTP)—Levels 1 (MTP1) through 3 (MTP3)
- Signaling Connection Control (SCCP)
- Application Service Part (ASP)
- Transaction Capabilities Application Part (TCAP)
- Telephony User Part (TUP)
- ISDN User Part (ISUP)

- Broadband ISUP (BISUP)

There are many variations of the different parts of the SS7 protocol stack. MTP has ANSI, ITU, Bellcore, and several national variations. Each country and each major carrier might have slightly different variations of a part to fit its particular needs.

The SS7 network must have the highest degree of reliability. Each switch with access to the SS7 network must be configured to a preconceived set of network parameters. There is some risk that the person configuring a switch is not using the correct set of parameters or values. Misconfiguration is the root cause of most SS7 problems at both the MTP layers and upper layers of the SS7 protocol. A single parameter value, such as an incorrect timer value, can cause SS7 connectivity to operate improperly or fail completely.

The first, and most important, step in troubleshooting SS7 related problems is to understand, and fully document, the SS7 network topology and protocols. The protocol documents are used as a reference over the months and years of maintenance on the SS7 network.

The following sections describe troubleshooting SS7 network:

- Signaling Channel Problems, page 6-95
- Signaling Destination Problems, page 6-100
- Signaling Channel Troubleshooting Procedures, page 6-103

Signaling Channel Problems

The Cisco PGW 2200 Softswitch software generates signaling alarms if it detects problems with the transportation of data on a signaling channel or at a signaling destination.

Signaling alarms have four classifications of severity:

- Critical
- Major
- Minor
- Informational

Note Multiple alarms are likely to occur for severe failures. For example, SUPPORT FAIL and SC FAIL would typically occur with LIF LOS.

Signaling links are the dedicated communication channels that the Cisco PGW 2200 Softswitch uses to transfer signaling information between itself, the Cisco ITP-Ls, and the Signal Transfer Points (STPs). Signaling links provide the necessary delivery reliability for higher-layer SS7 signaling protocols.

You can use the Cisco PGW 2200 Softswitch software and MML commands to manage signaling channels and lines. You can retrieve signaling channel attributes, change the states of signaling channels, and change the state of signaling lines. See Chapter 3, “Cisco PGW 2200 Softswitch Platform Operations,” for detailed information.

Note For more information on MML commands, see *Cisco PGW 2200 Softswitch Release 9 MML Reference*.

Because all types of signaling channels have basically the same functionality, you manage them similarly. Unless otherwise noted, all commands, counters, and alarms that are documented in this section apply to all types of signaling channels.

The following sections describe signaling channel problems:

- SS7 Link is Out-of-Service, page 6-96
- SS7 Load Sharing Malfunction, page 6-97
- Physical Layer Failures, page 6-98
- Configuration Errors, page 6-98
- Supporting Entity Failures, page 6-99
- Incomplete Signaling, page 6-99
- Changing Service States, page 6-99

SS7 Link is Out-of-Service

If an SS7 link is out-of-service on your system, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Change the service state of the SS7 link to in-service, as described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105.

If the SS7 link returns to service, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Verify that MTP1 is working correctly on the affected Cisco ITP-L, as described in the "Identifying MTP1 Communication Problems" section on page B-12.

If MTP1 is working correctly on the affected Cisco ITP-L, proceed to Step 4. Otherwise, correct the MTP1 problems according to instructions in the "Resolving MTP1 Communication Problems" section on page B-12.

Repeat Step 2. If the link returns to service, the procedure is complete. Otherwise, proceed to Step 7.

Step 4 Search for excessive SUREM/AERM errors and link failure messages in the active system log file, as described in the "Viewing System Logs" section on page 6-90.

If MTP2 is working correctly on the Cisco PGW 2200 Softswitch, proceed to Step 5. Otherwise, correct the MTP2 problems according to instructions in the "Resolving MTP2 Communication Problems" section on page B-13.

Repeat Step 1. If the link returns to service, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Verify that MTP2 is working correctly on the affected Cisco ITP-L, as described in the "Identifying MTP2 Communication Problems" section on page B-13.

If MTP2 is working correctly on the affected Cisco ITP-L, proceed to Step 6. Otherwise, correct the MTP2 problems according to instructions in the "Resolving MTP2 Communication Problems" section on page B-13.

Repeat Step 1. If the link returns to service, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Troubleshoot the SS7 link by following the instructions in the "Troubleshooting SS7 Link Problems" section on page B-5.

If you do not find any problems, proceed to Step 7. Otherwise, repeat Step 2. If the link returns to service, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SS7 Load Sharing Malfunction

If load sharing on your SS7 links or routes is not working properly, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:c7iplnk:"all"** command to verify the priority settings of the SS7 links.

The system returns a response like the following:

```
   MGC-02 - Media Gateway Controller 2001-07-24 12:11:44
M  RTRV
   "session=active:c7iplnk"
   /*
NAME        LNKSET       PRI          SLC          TIMESLOT     SESSIONSET
----        ------       ---          ---          --------     ----------
ls1link1     ls1          1            0            0            c7-slt1
ls1link2     ls1          1            1            0            c7-slt2
```

The PRI field in the response shows the priority settings for your SS7 links. For load sharing to work properly, the priority settings for all of the links should be set to 1.

Step 3 Enter the **prov-rtrv:ss7route:"all"** command to verify the priority settings of the SS7 routes.

The system returns a response like the following:

```
MGC-02 - Media Gateway Controller 2001-07-24 12:25:05
M  RTRV
   "session=active:ss7route"
   /*
NAME                 OPC                  DPC                  LNKSET      PRI
----                 ---                  ---                  ------      ---
route1               opc1                 dpc1                 ls1          1
rout2                opc1                 dpc2                 ls2          1
rt3                  opc2                 scp2                 ls-itu       1
rt1                  opc2                 stp1                 ls-itu       1
rt2                  opc2                 scp1                 ls-itu       1
   */
```

The PRI field in the response shows the priority settings for the SS7 routes. For load sharing to work properly, the priority settings for all of the routes should be set to 1.

Step 4 Start a provisioning session, as described in "Starting a Provisioning Session" section on page 3-64.

Step 5 If any of the SS7 links show a priority other than 1, change the priority settings to ensure proper link load sharing. Before changing the priority settings for the link, take the link out-of-service, as described in the "Setting the Service State of a C7/SS7 Link or Linkset" section on page 6-105.

Step 6 Modify the priority settings of the link by entering the **prov-ed:c7iplnk:name="*lnkname*",pri=1** command.

Where:

lnkname—Name of an SS7 link that is not set to priority 1.

Repeat this step for each link that is not set to priority 1.

Step 7 If any of the SS7 routes show a priority other than 1, change the priority settings to ensure proper route load sharing. Before changing the priority settings for the route, take the route out-of-service, as described in the "Setting the Service State of an SS7 Signaling Service" section on page 6-104.

Step 8 Modify the priority settings of the link by entering the **prov-ed:ss7route:name="*rtname*",pri=1** command.

Where:

rtname—Name of an SS7 route that is not set to priority 1.

Repeat this step for each route that is not set to priority 1.

Step 9 Save and activate your provisioning changes, as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If the condition clears, the procedure is complete. Otherwise, proceed to Step 10.

Step 10 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Physical Layer Failures

The major issues pertaining to the physical layer of an SS7 signaling link are related to cabling, clock source, and connector pinouts. The cable should be of high quality (shielded) and the connectors should be attached and crimped solidly. Because SS7 links are synchronous, one side of the link must provide the clock source and the other side must use this clock signal to read the bits.

The most common mistake is to use the wrong cable pinouts for a specific physical configuration. Make sure that the connector has the correct number of pins (RJ-45, DB-25) and that each pin maps to the correct signal. Several physical layers are supported, including ANSI T1, CEPT E1, and V.35. Ensure that the cable complies with the connector and the physical protocol being used.

If the configuration appears to be valid and the cable pinout is good, check that the signal is being sent and received correctly. Use a Bit Error Rate Tester (BERT) or perform a signal loopback on the interface. It is possible that the cable is bad, so try to replace it. The line card might be defective, so consider replacing it.

Configuration Errors

The most common mistake in SS7 signal link configuration is to misconfigure the Signal Link Code (SLC) for the SS7 link. The SLC is a preconfigured code on both ends of the link. If the SLC or the point codes do not match, the link does not align and no transmission can take place.

For T1 and E1 connectors, an SS7 signaling link is carried in a single 56- or 64-kbps time slot. The time slot that is used must also match on both sides of the link.

Ensure that the MTP2 timers and thresholds match the network defaults. Confirm that the far-end switch or STP has the same values as your system.

When you use a Cisco ITP-L to terminate MTP2, confirm that the RUDP parameters match on both sides and are consistent with the documentation.

Supporting Entity Failures

An SS7 signaling link has a hierarchy of network element entities that must be functioning before the link can function. The entities include the physical interface (discussed previously) and the control software for the link. If any of these entities fail, the link also fails.

Incomplete Signaling

The following problems can cause a link to fail between the Cisco ITP-L and the Cisco PGW 2200 Softswitch.

- Ethernet card failure on the Cisco ITP-L
- Ethernet card failure on the Cisco switch
- Cisco switch failure
- Fast Ethernet interface card failure on the Cisco PGW 2200 Softswitch

In each of the preceding cases, it is impossible to transfer MTP3 signaling messages from the Cisco ITP-L to the Cisco PGW 2200 Softswitch. Cisco ITP-L platform failure (which is equivalent to MTP2 failure) prevents signaling messages from going to MTP3. The MTP2 layer on the Cisco ITP-L is supposed to send SIPO messages to the STP mated pair to start the changeover procedure. The mated STP pair, which detects timer expiration and link unavailability, detects Cisco ITP-L platform failure on the SS7 network.

Changing Service States

Signal channels comply with the Generic Service State model that is defined in the "Physical Layer Failures" section on page 6-98. You can change the service state of a signaling channel by using the following transition requests. Note that there is a difference between a desired service state and an actual service state, and the Cisco PGW 2200 Softswitch might not be able to honor the request. For example, a signal channel that is out-of-service because of an equipment failure cannot transition to an in-service state upon request. The Cisco PGW 2200 Softswitch attempts to bring the channel in-service, but it fails. You must resolve the failure before the transition can succeed.

- In-service (IS)—Signaling channel is requested to start providing service.
- Out-of-service (OOS)—Signaling channel is requested to stop providing service.

  For some protocols, the system accepts this request, but does not grant the request until after all calls have been released. During the interim period, the channel service state appears as OOS, PEND.
- Forced out-of-service (FOOS)—Signaling channel is requested to stop providing service immediately, regardless of related call states, and to drop currently active calls.
- Inhibit (INH)—Signaling channel is requested to transition to an inhibit state. This state is for SS7 signaling channels only and fails on other types of signaling channels.

  In this state, the channel is active but does not provide service for call processing. If the signaling channel is the last one in the signal path, the system denies the inhibit request and returns an error.

- Uninhibit (UNH)—Signaling channel is requested to be removed from an INH state and to provide service for call processing. This state is for SS7 signaling channels only and fails on other types of signaling channels.

  Use this option (UNH), rather than the IS option, to return an inhibited signaling channel to service.

Note Changing the state of a signaling channel generates an alarm. For more information on retrieving and clearing alarms, see the "Troubleshooting Using Cisco PGW 2200 Softswitch Alarms" section on page 6-3.

Signaling Destination Problems

Signaling destinations refer to the endpoints of a network. Typically, if signaling links are in service, the signaling destinations should also be in service.

For ISDN signaling, the signaling channel is in service if the Cisco PGW 2200 Softswitch can communicate with the media gateway and ISDN backhaul is configured. The destination is in service if the signaling channel is in service and the remote ISDN device is in service.

Apparent mismatches can occur because of:

- SS7 traffic restart processing (TRW/TRA)
- SS7 STP problems
- Configuration problems
- Software problems

The Cisco PGW 2200 Softswitch regards an SS7 STP as an adjacent point code (APC). SS7 MTP uses a message exchange called Signaling Link Test Message (SLTM)/Signaling Link Test Acknowledgment (SLTA) to confirm that the far-end point code is the one configured. The SLTM consists of the originating point code (OPC) of the Cisco PGW 2200 Softswitch, an APC number, and an SS7 network indicator. If the values for these parameters match with the values used at the far-end switch, an SLTA is returned. If the value for any of these parameters does not match, the far-end switch does not send an SLTA. The Cisco PGW 2200 Softswitch drops the link and tries to realign it. This process continues until the SLTM parameters match on both sides. The symptom of this problem is SS7 links dropping and recovering in roughly 30-second cycles (this symptom is referred to as bouncing).

The following sections describe signaling destination problems:

- Bouncing SS7 Links, page 6-101
- Configuration Errors, page 6-101
- Traffic Restart, page 6-102
- SS7 Destination is Out of Service, page 6-102
- SS7 Route is Out of Service, page 6-102
- SS7 Destination is Unavailable, page 6-103

Bouncing SS7 Links

Usually, mismatched signaling link codes (SLCs) or DPCs/OPCs between the Cisco PGW 2200 Softswitch and the far end cause this condition. To resolve a bouncing SS7 condition, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the SLC, OPC, and DPC provisioning settings match with the settings used on the far end. To verify settings, enter the **prov-rtrv** MML command for the SS7 link, OPC, and DPC components, as described in the "Retrieving Provisioning Data" section on page 3-69. Compare the values that are retrieved with the settings used by the far end.

If the provisioning settings for the SLC, OPC, and DPC match the settings that are used on the far end, proceed to Step 3. Otherwise, modify the settings to match the settings that are used on the far end. See the "Invoking Dynamic Reconfiguration" section on page 3-66 for more information about modifying the settings of a provisioned component. If that clears the problem, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Ensure that the local MTP3 timer settings match the network defaults by following the instructions in the "Verifying MTP3 Timers" section on page 6-108.

If the local MTP3 timer settings match the network defaults, proceed to Step 4. Otherwise, contact the far-end to determine whether they can change timer settings to match your settings. If that clears the problem, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 View the system logs, as described in the "Viewing System Logs" section on page 6-90, looking for excessive alignment error monitoring (AERM) logs. If large numbers of AERM logs are present, proceed to Step 5.

If no AERM logs are present, proceed to Step 6.

Step 5 Determine why the link is not aligning properly by checking the alignment status on the Cisco ITP-L associated with the affected link, as described in the "Verifying the Link Alignment Status" section on page B-6.

If the condition clears, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Configuration Errors

If the SS7 DPC is fully associated, it can have the same SLTM/SLTA problems that were described in the preceding section.

If the SS7 DPC is quasi-associated, the most common cause for failure is a route misconfiguration. Review the route information between the Cisco PGW 2200 Softswitch and the DPC to ensure that the APCs are valid, the route priorities are set correctly, and the route uses the appropriate linkset.

Traffic Restart

Ensure that the MTP3 traffic restart timers and thresholds agree with the network defaults. Confirm that the far-end switch or STP has the same values.

SS7 Destination is Out of Service

Typically, a signaling destination is out of service when all the SS7 links from the Cisco PGW 2200 Softswitch to the destination or APC are out of service, or when all of the SS7 links from the destination to the APC are out of service.

To restore an SS7 destination to service, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Contact your SS7 provider to verify the links from the DPC to the associated STP.

Step 3 Verify the state of the signaling channels, as described in the "Verifying the Status of all Signaling Services" section on page 3-9.

If any of the SS7 links are out-of-service, restore the links according to the instructions in the "SS7 Link is Out-of-Service" section on page 6-96. If all of the SS7 links to a destination are out-of-service, restore the destination as described in the "SS7 Destination is Out of Service" section on page 6-102.

If the condition clears, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SS7 Route is Out of Service

To restore an SS7 route to service, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Change the service state of the destination to in-service, as described in the "Setting the Service State of a Signaling Service" section on page 6-103.

If the destination goes into service, the procedure is complete. Otherwise, proceed to Step 3.

Step 3 Verify the state of the signaling channels, as described in the "Verifying the Status of all Signaling Services" section on page 3-9.

If none of the SS7 links are in-service, proceed to Step 4. If all or at least one of the SS7 links to the destination are in-service, then contact your SS7 provider to verify the links from the DPC to the associated STP.

Step 4 Determine why the link is not aligning properly by checking the alignment status on the Cisco ITP-L that is associated with the affected link, as described in the "Verifying the Link Alignment Status" section on page B-6.

If the condition clears, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

SS7 Destination is Unavailable

An SS7 destination is unavailable when all of the routes to the destination are out-of-service. Perform the procedure that is defined in the "SS7 Route is Out of Service" section on page 6-102.

Signaling Channel Troubleshooting Procedures

The following sections present procedures that you can follow to resolve problems that are associated with the Cisco PGW 2200 Softswitch platform signaling connections to other networks:

- Setting the Service State of a Signaling Service, page 6-103
- Setting the Service State of an SS7 Signaling Service, page 6-104
- Setting the Service State of a C7/SS7 Link or Linkset, page 6-105
- Setting the Service State of an IP Link, page 6-105
- Setting the Service State of an IP Route, page 6-106
- Setting the Service State of a D-channel, page 6-106
- Setting the Service State of a Local Subsystem Number, page 6-107
- Setting the Service State of an Association, page 6-107
- Verifying MTP Timer Settings, page 6-107
- Modifying Configurable Timers, page 6-109
- Managing Japanese SS7 Signaling Link Tests, page 6-118
- Managing Japanese SS7 Signaling Route Tests, page 6-119
- Verifying Proper Loading of a Dial Plan, page 6-121
- Verifying Configuration to Support Multiple Versions of SS7, page 6-121
- Resolving an Association Alarm, page 6-122
- Converting Stored and Sent Point Code Values, page 6-122

Setting the Service State of a Signaling Service

To set the service state of a signaling service, perform the following steps:

Caution Use the **set-dest** command only while you are dynamically reconfiguring the system. Do not use the **set-dest** command to take a signaling service out-of-service during a maintenance session, because all calls associated with the specified signaling service are dropped. Instead, when you need to perform maintenance, use the **blk-cic** command to block the CICs associated with the signaling service.

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-dest:*sig_srv*:*serv_state*** command.

Where:

- *sig_srv*—MML name of the desired signaling service.
- *serv_state*—Desired service state. The following service states are valid:
  - IS—Places a signaling service in service.
  - OOS—Takes a signaling service out of service.

Note Before you can take a NAS signaling service out of service, you must shut down the D-channel on the associated media gateway. See the documentation for the media gateway for more information on shutting down D-channels.

For example, to set the service state of a signaling service called sigsrv1 to IS, enter the **set-dest:sigsrv1:IS** command:

Step 2 Verify that the state of the destination has changed by entering the **rtrv-dest** command, as described in the Retrieving Signaling Service States, page 3-45.

Setting the Service State of an SS7 Signaling Service

To set the service state of an SS7 signaling service, perform the following steps:

Caution Use the **set-spc** command only while you are dynamically reconfiguring the system. Do not use the **set-spc** command to take an SS7 signaling service out-of-service during a maintenance session, because all calls associated with the specified SS7 signaling service are dropped. Instead, when you need to perform maintenance, use the **blk-cic** command to block the CICs associated with the SS7 signaling service.

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-spc:*ss7_srv*:*serv_state*** command.

Where:

- *ss7_srv*—MML name of the SS7 signaling service that you want to set.
- *serv_state*—Service state you want to set. The following service states are valid:
  - IS—Places the SS7 signaling service in service.
  - OOS—Takes the SS7 signaling service out of service.

For example, to set the service state of an SS7 signaling service called ss7srv1 to IS, enter the **set-spc:ss7srv11:IS** command:

Step 2 Verify that the state of the SS7 signaling service has changed by entering the **rtrv-spc** CRIT command, as described in the Retrieving the State of SS7 Signaling Services, page 3-48.

Setting the Service State of a C7/SS7 Link or Linkset

To change the service state of an SS7 link, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-c7lnk:*c7link_name*:*serv_state*** command.

Where:

- *c7link_name*—MML name of the SS7 link you want to modify.
- *serv_state*—Service state to set. Valid values for SS7 links are IS, OOS, FOOS, INH, and UNH.

Note To set the last link in a linkset out of service, you must enter the FOOS service state in the command.

For example, to set the service state of the SS7 link (c7link1) to IS, enter the **set-c7lnk:c7link1:IS** command.

Verify if the selected SS7 link is in the proper service state by performing the procedure in the Retrieving Service State of C7/SS7 Links or Linksets, page 3-45.

Note To modify the service state of the backhaul link for the Cisco ITP-L, set the state of all link types that are associated with that Cisco ITP-L. The possible link types are S77 links (c7lnk), D-channels, (dchan), and IP links (iplnk).

Setting the Service State of an IP Link

To change the service state of an IP link, login to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-iplnk:*iplink_name*:*serv_state*[::confirm]** command.

Where:

- *iplink_name*—MML name of the IP link you want to modify.
- *serv_state*—Service state that you want to set. Valid values for IP links are IS, OOS, and FOOS.
- confirm—This parameter is required when you are setting the service state of an MGCP link. Other types of IP links do not require this parameter.

For example, to set the service state of the IP link (iplink1) to IS, enter the **set-iplnk:iplink1:IS** command.

For example, enter the **set-iplnk:mgcplnk1:IS:confirm** command to set the service state of an MGCP link called mgcplnk1 to IS.

Verify that the selected IP link is in the proper service state by performing the procedure in the "Retrieving the Service State for IP Links" section on page 3-46.

Note To modify the service state of the backhaul link for the Cisco ITP-L, set the state of all link types that are associated with that Cisco ITP-L. The possible link types are S77 links (c7lnk), D-channels (dchan), and IP links (iplnk).

Setting the Service State of an IP Route

To change the service state of an IP route, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-iproute:*iproute_name*:*serv_state*[,confirm]** command.

Where:

- *iproute_name*—MML name of the IP route you want to modify.
- *serv_state*—Service state that you want to set. Valid values for IP links are IS, OOS, and FOOS.
- confirm—Required parameter when you are setting the service state to OOS or FOOS.

Note You cannot use this command on the standby Cisco PGW 2200 Softswitch.

You can set an IP route in any of the following combinations of primary and secondary service states to OOS or FOOS:

- IS
- OOS, CONF
- OOS, OFF_DUTY
- OOS, STDBY

To set an IP route to IS, the IP route must have a primary service state of OOS and secondary service state of COOS.

For example, to set the service state of an IP route called iprte1 to OOS, enter the **set-iproute:iprte1:OOS,confirm** command.

Note Verify that the selected IP route is in the proper service state by performing the procedure in the "Retrieving the Service State for IP Routes" section on page 3-46.

Setting the Service State of a D-channel

To change the service state of a D-channel, login to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-dchan:*dchan_name*:*serv_state*** command.

Where:

- *dchan_name*—MML name of the D-channel you want to modify.
- *serv_state*—Service state to set. Valid values for D-channels are IS and OOS.

For example, to set the service state of the D-channel, **dchan-1**, to IS, enter the **set-dchan:dchan-1:IS** command.

Verify that the selected D-channel is in the proper service state by performing the procedure in the "Retrieving the Service State of D-Channels" section on page 3-47.

Note To modify the service state of the backhaul link for the Cisco ITP-L, set the state of all link types that are associated with that Cisco ITP-L. The possible link types are S77 links (c7lnk), D-channels (dchan), and IP links (iplnk).

Setting the Service State of a Local Subsystem Number

To set the service state of a local subsystem number (LSSN), perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-lssn-state:ssn:*serve_state*** command.

Where:

- *ssn*—MML name of the desired LSSN.
- *serv_state*—Desired service state. The following service states are valid:
  - IS—Places an LSSN in service.
  - OOS—Takes an LSSN out of service.

For example, to set the service state of an LSSN called lnp to IS, enter the **set-lssn-state:lnp:IS** command.

Step 2 Verify that the state of the LSSN has changed by entering the **rtrv-lssn** command, as described in the "Retrieving the State of All Local Subsystem Numbers" section on page 3-49.

Setting the Service State of an Association

To change the service state of an association, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-association:*assoc_name*:*serv_state*[,confirm]** command.

Where:

- *assoc_name*—MML name of the association you want to modify.
- *serv_state*—Service state to set. Valid values for IP links are IS, OOS, and FOOS.
- confirm—Required parameter when you are setting the service state to OOS or FOOS.

Note You cannot use this command on the standby Cisco PGW 2200 Softswitch.

For example, to set the service state of the association, assoc1, to OOS, enter the **set-association:assoc1:OOS,confirm** command.

Verify that the selected association is in the proper service state by performing the procedure in the "Retrieving the Service State for Associations" section on page 3-50.

Verifying MTP Timer Settings

When resolving signaling problems between the Cisco PGW 2200 Softswitch and an associated SS7 network element (such as an STP), you might need to verify that the MTP2 and MTP3 timer settings that the Cisco PGW 2200 Softswitch uses conform to settings of the associated SS7 network element. Use MML commands on the Cisco PGW 2200 Softswitch to retrieve the settings for the MTP2 and MTP3 timers. The following subsections describe methods for verifying the MTP timer settings on the Cisco PGW 2200 Softswitch.

Note See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on the MTP timers.

Verifying MTP2 Timers

To verify the values that are used for the MTP2 timers on the Cisco ITP-Ls, complete the following steps:

Step 1 Enter the **#show ss7 mtp2 timer *channel*** command at the Cisco ITP-L to display the settings for the MTP2 timers.

Where:

channel—Specifies a channel, 0 through 3.

The system returns a message like the following:

```
SS7 MTP2 Timers for channel 0 in milliseconds
Protocol version for channel 0 is Japan NTT Q.703 Version 1-1
    T1 aligned/ready = 15000
      T2 not aligned = 5000
          T3 aligned = 3000
T4 Emergency Proving = 3000
   T4 Normal Proving = 3000
      T5 sending SIB = 200
      T6 remote cong = 3000
 T7 excess ack delay = 2000
  T8 errored int mon = 0
TA SIE timer = 20
       TF FISU timer = 20
        TO SIO timer = 20
       TS SIOS timer = 20
```

Step 2 Compare the MTP2 timers settings that are listed for the Cisco ITP-Ls to the MTP2 timers that are used at the associated destination.

If the MTP2 timers settings match, the timer settings are not causing the signaling problem. Continue troubleshooting the problem.

If the MTP2 timers settings do not match, perform the procedure in the "Modifying MTP2 Timers" section on page 6-109.

Verifying MTP3 Timers

To verify the values that are used for the MTP3 timers, complete the following steps:

Step 1 Log on to active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:lnksetprop:name="*MML_name*"** command to display the settings for the MTP3 timers.

Where:

MML_name—MML name for the linkset that is associated with the MTP3 timers you want to verify.

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2000-07-27 18:33:56
M RTRV
"session=nsite04:sigsvcprop"
/*
    mtp3ApcMtpRstrtT28 = 50
    mtp3DlnkConnAckT7 = 10
    mtp3FrcUnhT13 = 10
    mtp3InhAckT14 = 20
    mtp3LocInhTstT20 = 900
    mtp3MaxSltTries = 2
    mtp3MsgPriority = 2
    mtp3MtpRstrtT24 = 60
    mtp3RepeatRstrtT26 = 150
    mtp3TfrUsed = false
    mtp3TraSnT29 = 600
    mtp3tstSltmT1 = 60
    mtp3tstSltmT2 = 600
    mtp3UnhAckT12 = 10
    reference = ANSI96
```

Step 2 Compare the listed MTP3 timers settings to the MTP3 timers that are used at the associated destination.

If the MTP3 timers settings match, the timer settings are not causing the signaling problem. Continue troubleshooting the problem.

Modifying Configurable Timers

In earlier releases of the Cisco PGW 2200 Softswitch software, you could not modify the settings of the message transfer part level 3 (MTP3) and redundant link manager (RLM) timers. You can modify the settings of these timers. The following sections describe the procedures for verifying and modifying the timers:

- Modifying MTP2 Timers, page 6-109
- Verifying and Modifying MTP3 Timer Settings, page 6-110
- Verifying and Modifying RLM Timers, page 6-112
- Verifying and Modifying ISUP Timer Settings, page 6-113
- Rebooting Your System to Modify Properties, page 6-117

Modifying MTP2 Timers

Use the following MML commands at the Cisco ITP-L to modify the settings for the MTP2 timers:

```
Router (config)#ss7 mtp-variant standard channel
Router(config-standard)# parameters
```

Where:

- *standard*—Name of the SS7 standard that is used for your links. Valid values are Bellcore, ITU, NTT, and TTC
- *channel*—Specifies a channel, 0 through 3
- *parameters*—Timer number and the new value for the timer

Note See *Cisco Signaling Link Terminal* for more information on the parameters for this command.

In the following example, the aligned/ready timer duration on channel 0 is set to 30,000 ms:

```
Router(config)# ss7 mtp2-variant Bellcore 0
Router(config-Bellcore)# T1 30000
```

In the following example, the aligned/ready timer is restored to its default value of 13,000 ms:

```
Router(config)# ss7 mtp2-variant Bellcore 0
Router(config-Bellcore)# no T1
```

After the modification is complete, verify the new settings according to the procedure in the "Verifying MTP2 Timers" section on page 6-108.

Verifying and Modifying MTP3 Timer Settings

When resolving signaling problems between the Cisco PGW 2200 Softswitch and an associated SS7 network element (such as an STP), you might need to verify that the Cisco PGW 2200 Softswitch MTP3 timer settings conform to settings on the associated SS7 network element. If the settings do not match, you must modify the settings for the MTP3 timers.

Note See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on the MTP timers.

To verify and modify the values that are used for the MTP3 timers, complete the following steps:

Step 1 Log on to active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:sigsvcprop:name="*protocol*"** command to display the settings for the MTP3 timers.

Where:

protocol is the MML name for the SS7 protocol family being used, such as SS7-ANSI or SS7-ITU.

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2001-06-01 10:31:00
M  RTRV
   "session=active:lnksetprop"
   /*
mtp2AermEmgThr = 1
mtp2AermNrmThr = 4
mtp2CongDiscard = false
mtp2LssuLen = 1
mtp2MaxAlignRetries = 5
mtp2MaxMsuFrmLen = 272
mtp2MaxOutsFrames = 127
mtp2ProvingEmgT4 = 6
mtp2ProvingNormalT4 = 23
mtp2SuermThr = 64
mtp2T1 = 130
mtp2T2 = 115
mtp2T3 = 115
mtp2T5 = 1
mtp2T6 = 30
mtp2T7 = 10
```

```
mtp3ApcMtpRstrtT28 = 30
mtp3DlnkConnAckT7 = 10
mtp3FrcUnhT13 = 10
mtp3InhAckT14 = 20
mtp3LocInhTstT20 = 900
mtp3MaxSltTries = 2
mtp3MsgPriority = 2
mtp3MtpRstrtT24 = 100
mtp3RepeatRstrtT26 = 150
mtp3TfrUsed = false
mtp3TraSntT29 = 600
mtp3tstSltmT1 = 60
mtp3tstSltmT2 = 600
mtp3UnhAckT12 = 10
reference = ANSI92
rudpAck = enable
rudpKeepAlives = enable
rudpNumRetx = 2
rudpRetxTimer = 6
rudpSdm = enable
rudpWindowSz = 32
```

Step 2 Compare the displayed MTP3 timers to the MTP3 timers on the associated destination.

If the MTP3 timers settings match, the timer settings are not causing the signaling problem. Check for alarms on your system and resolve them using the procedures in the "Alarm Troubleshooting Procedures" section on page 6-4.

If the MTP3 timers settings do not match, proceed to Step 3.

Step 3 Start a provisioning session by using the procedure in the "Starting a Provisioning Session" section on page 3-64.

Step 4 Modify the parameters for the desired MTP3 timers by entering the **prov-ed:lnkset:name="*protocol*",*param_name*=*param_value*** command.

Where:

- *protocol*—MML name for the SS7 protocol family, such as SS7-ANSI or SS7-ITU.
- *param_name*—Name of the MTP timer you want to change.
- *param_value*—New value for the MTP timer.

Note See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for more information on the parameters for this command.

In the following example, the MTP3 T1 timer, waiting for signaling link test acknowledgment message, is set to 65 tenths of a second.

```
prov-ed:lnkset:name="SS7-ANSI",mtp3tstSltmT1=65
```

Step 5 Save and activate your provisioning session by using the procedure in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 6 Reboot your system as described in the "Rebooting Your System to Modify Properties" section on page 6-117.

Verifying and Modifying RLM Timers

To change the values for these timers, change them on the Cisco PGW 2200 Softswitch and on the associated media gateways. See the documentation for your media gateway for more information on changing the RLM timers on the media gateway. To change the RLM timers on the Cisco PGW 2200 Softswitch, perform the following steps.

Note RLM keepalives are sent only when traffic has not been sent for some time; that is, when the Cisco PGW 2200 Softswitch receives a signaling message, the RLM keepalive timer is reset. The media gateway sends RLM keepalives to the Cisco PGW 2200 Softswitch. If the RLM keepalive timer on the Cisco PGW 2200 Softswitch expires, the system sets the IP link out-of-service. Increasing the RLM keepalive timer values on both sides can ensure that the IP link is not reset during transient conditions in the IP network, when the default values might be too stringent. However, if your system is in a continuous service configuration, increasing the values of the RLM keepalive timers reduces the system's ability to quickly detect a link failure. Systems in a simplex configuration would not be affected.

Step 1 Verify the current settings of your RLM timers on the Cisco PGW 2200 Softswitch by logging in to the standby Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:lnksetprop:name="protocol_fam"** command.

Where:

protocol_fam is the MML name for the associated protocol family.

For example, to retrieve the values of RLM timers for an ANSI signaling environment, enter the **prov-rtrv:lnksetprop:name="ss7-ANSI"** command.

The system returns a response like the following:

```
   MGC-01 - Media Gateway Controller 2001-07-27 11:00:06
M  RTRV
   "session=active:lnksetprop"
   /*
linkEchoRetry = 3
linkLatencyTest = 600
linkOpenWait = 30
linkRecovery = 120
linkSwitch = 50
linkUpRecoveredMin = 600
port = 3000
PropagateSvcMsgBlock = false
timerCmdAck = 10
timerLinkDownMin = 100
timerLinkEcho = 10
unstableLink = 10
   */
```

All the properties that are listed, except for port and PropagateSvcMsgBlock, are RLM timer properties.

Step 2 Start a provisioning session by using the procedure in the "Starting a Provisioning Session" section on page 3-64.

Step 3 Modify the RLM timer properties, as needed, by issuing the **prov-ed:lnksetprop:name=*"protocol_fam"*,*prop_name*=*"value"*,*prop_name*=*"value"*,...** command.

Where:

- *protocol_fam*—MML name of the associated protocol family.
- *prop_name*—Name of the RLM timer property you want to modify.
- *value*—Value you want to set for the specified RLM timer property.

For example, to change the values of RLM timers for an ANSI signaling environment, enter the **prov-ed:lnksetprop:name="ss7-ANSI",timerLinkDownMin="120",timerLinkEcho="15"** command.

Step 4 Save and activate your provisioning session by using the procedure in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 5 Reboot your system as described in the "Rebooting Your System to Modify Properties" section on page 6-117.

Verifying and Modifying ISUP Timer Settings

When resolving signaling problems, you might need to verify that the Cisco PGW 2200 Softswitch ISUP timer settings the conform to the settings on the associated network elements. If the settings do not match, modify the settings for the ISUP timers. You can modify the settings of the local ISUP timers. The timers are grouped according to the associated ISUP protocols for each timer. You cannot change other ISUP timers.

Table Table 6-2 lists the configurable ISUP timers.

Table 6-2 Configurable ISUP Timer Protocol Listings

Timers	Associated Protocol Files
• T1	• ANSISS7_STANDARD • Q761_BASE • Q767_BASE • Q761_SINGAPORE • Q761_ARGENTINA • ISUPV2_FINNISH96 • ISUPV2_FRENCH • Q761_THAILAND • Q761_PERU • Q761_BELG_C2 • ISUPV2_JAPAN
• T2, T5, T6 • T7, T8, T9 • T12, T13, T14 • T15, T16, T17 • T18, T19, T20 • T21, T22, T23 • T24, T25, T26 • T27, T33, T36	• ANSISS7_STANDARD • Q761_BASE • Q767_BASE • Q761_SINGAPORE • Q761_ARGENTINA • ISUPV2_SPANISH • ISUPV2_FINNISH96 • ISUPV2_FRENCH • Q761_THAILAND • Q761_PERU • Q761_BELG_C2 • ISUPV2_JAPAN
• T28 • T34	• ANSISS7_STANDARD • Q761_BASE • Q761_SINGAPORE • Q761_ARGENTINA • ISUPV2_SPANISH • ISUPV2_FINNISH96 • ISUPV2_FRENCH • Q761_THAILAND • Q761_PERU • Q761_BELG_C2 • ISUPV2_JAPAN

Table 6-2 Configurable ISUP Timer Protocol Listings (continued)

Timers	Associated Protocol Files
• T35	• Q761_BASE • Q767_BASE • Q761_SINGAPORE • Q761_ARGENTINA • ISUPV2_SPANISH • ISUPV2_FINNISH96 • ISUPV2_FRENCH • Q761_THAILAND • Q761_PERU • Q761_BELG_C2 • ISUPV2_JAPAN
• T38	• Q761_BASE • Q761_SINGAPORE • Q761_ARGENTINA • ISUPV2_SPANISH • ISUPV2_FINNISH96 • ISUPV2_FRENCH • Q761_THAILAND • Q761_BELG_C2 • ISUPV2_JAPAN
• T_CCR • T_CCRR • T_CGB • T_CGBA • T_CRA • T_GRS • T_CVT	ANSISS7_STANDARD

Note For the default values and valid ranges for each of these timers within the supported protocols, see *Cisco PGW 2200 Softswitch Release 9 MML Command Reference*.

To verify and modify the values that are used for the ISUP timers, complete the following steps:

Step 1 Unless you previously created a profile for the associated signaling service or trunk group with modified values for these ISUP timers, the values for these eight timers match the default values listed in the preceding table. If you previously created a profile with modified ISUP timer values for the associated signaling service or trunk group, proceed to Step 2 to retrieve the current values that are set in the profile. Otherwise, proceed to Step 3.

Step 2 Log on to active Cisco PGW 2200 Softswitch, start an MML session, and enter the **prov-rtrv:profile:name=*"profile_name"*** command to display the settings for the modified ISUP timers.

Where:

profile_name is the MML name for the profile that contains the modified values for the configurable ISUP timers.

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2002-10-07 15:47:39.928 EST
M  RTRV
   "session=NOA_SPAIN:profile"
   /*
ProfileType          PropertyName         ProfileValue
-------------------- -------------------- -----------
isuptmrprofile T1  5000
   */
```

Step 3 Compare the displayed ISUP timers settings listed to the ISUP timers on the associated destination.

If the ISUP timers settings match, the timer settings are not causing the signaling problem. Check for alarms on your system and resolve them using the procedures in the "Alarm Troubleshooting Procedures" section on page 6-4.

If the ISUP timers settings do not match, proceed to Step 4.

Step 4 Start a provisioning session, using the procedure in the "Starting a Provisioning Session" section on page 3-64.

Step 5 If you have already defined a profile that modifies the configurable ISUP timers, proceed to Step 8. Otherwise, proceed to Step 6.

Step 6 Enter your new ISUP timer values using the **prov-add:profile:name="*profile_name*",type="isuptmrprofile", *timer_number*="*timer_value*", *timer_number*="*timer_value*", *timer_number*="*timer_value*"...** command.

Where:

- profile_name—MML name for the profile that contains the set of ISUP measurements in use.
- *timer_number*—Number of the timer you want to modify.
- *timer_value*—New value for the selected ISUP timer.

Note See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on the valid ranges for the ISUP timers. If you enter a number outside the valid range, the default value is used.

In the following example, the command modifies the values of the T6, T8, and T35 ISUP timers:

```
prov-add:profile:name="set1",type="isuptmrprofile",T6="30000",T8="12000",T35="18000"
```

Step 7 Create a profile for your new ISUP timer values by using the **prov-add:*component*:name="*comp_name*", isuptmrprofile="*profile_name*"** command.

Where:

- *component*—MML component type name for signaling service or trunk group profiles. Enter one of the following:
  - sigpathprof—Component type for signaling service profiles.
  - trnkgrpprof—Component type for trunk group profiles.
- *comp_name*—MML name for the signaling service or trunk group profile to associate with the set of new ISUP timer values, as set in Step 6.
- profile_name—MML name for the profile that contains the customized set of ISUP measurements, as set in Step 6.

Once the new ISUP timer values are set, proceed to Step 9.

Step 8 Modify the parameters for the selected ISUP timers by entering the **prov-ed:profile:name="*profile_name*",type="isuptmrprofile", *timer_number*="*timer_value*", *timer_number*="*timer_value*", *timer_number*="*timer_value*"...** command.

Where:

- profile_name—MML name for the profile that contains the set of ISUP measurements in use.
- *timer_number*—Number of the timer that you want to modify.
- *timer_value*—New value for the selected ISUP timer.

Note See *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide* for more information on the valid ranges for the ISUP timers. If you enter a number outside the valid range, the system uses the default value.

In the following example, the command modifies the values of the T6, T8, and T33 ISUP timers:

```
prov-ed:profile:name="set1",type="isuptmrprofile",T6="180",T8="12",T33="14"
```

After you set the new ISUP timer values, proceed to Step 9.

Step 9 Save and activate your provisioning session, using the procedure in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Rebooting Your System to Modify Properties

When you modify MTP3 and RLM timers on the Cisco PGW 2200 Softswitch, you must reboot the system as part of the modification process. To modify the timers, perform the following steps:

Step 1 Log in to your active Cisco PGW 2200 Softswitch and change directories to the /opt/CiscoMGC/etc directory using the **cd /opt/CiscoMGC/etc** UNIX command.

Step 2 Open the XECfgParm.dat file in a text editor, such as vi.

Step 3 Search for the pom.dataSync property and ensure that it is set to *false*.

Step 4 Save the file and exit the text editor.

Step 5 Shut down the Cisco PGW 2200 Softswitch software on your active Cisco PGW 2200 Softswitch, using the procedure in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Note Shutting down the Cisco PGW 2200 Softswitch software on the active Cisco PGW 2200 Softswitch causes the currently standby Cisco PGW 2200 Softswitch to become the active Cisco PGW 2200 Softswitch.

Step 6 Restart the Cisco PGW 2200 Softswitch software on the Cisco PGW 2200 Softswitch, using the procedure in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 7 After the Cisco PGW 2200 Softswitch software is fully activated, log in to the active Cisco PGW 2200 Softswitch and perform a manual switchover, using the procedure in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 8 After the manual switchover is complete, log in to the newly active Cisco PGW 2200 Softswitch, start an MML session and enter the **prov-sync** command to synchronize the Cisco PGW 2200 Softswitches.

Step 9 After the synchronization is complete, perform a manual switchover using the procedure in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 10 After the manual switchover is complete, log in to your newly standby Cisco PGW 2200 Softswitch and change directories to the /opt/CiscoMGC/etc directory using the **cd /opt/CiscoMGC/etc** UNIX command.

Step 11 Open the XECfgParm.dat file in a text editor, such as vi.

Step 12 Search for the pom.dataSync property and ensure that it is set to *true*.

Step 13 Save the file and exit the text editor.

Step 14 Shut down the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch by entering the **/etc/init.d/CiscoMGC stop** UNIX command:

Step 15 Restart the Cisco PGW 2200 Softswitch software on the Cisco PGW 2200 Softswitch by entering the **/etc/init.d/CiscoMGC start** command.

Managing Japanese SS7 Signaling Link Tests

The following subsections detail the procedures that are used to manage the tests that you can run on a signaling link that is configured for Japanese SS7:

- Starting a Japanese SS7 Signaling Link Test, page 6-119
- Retrieving Results for a Japanese SS7 Signaling Link Test, page 6-119

Starting a Japanese SS7 Signaling Link Test

To start a signaling link test on a link that is configured for Japanese SS7, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-ss7-slt:*link*** command.

Where *link* is the MML name of a link that is configured for Japanese SS7.

For example, to start a signaling link test on a link that is called ls1-link1, enter the **sta-ss7-slt:ls1-link1** command.

Retrieving Results for a Japanese SS7 Signaling Link Test

To retrieve the results of a Japanese SS7 signaling link test, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-ss7-slt:*link*** command.

Where *link* is the MML name of a link that is configured for Japanese SS7.

For example, to retrieve the results of a signaling link test that is run on a link that is called ls1-link1, enter the **rtrv-ss7-slt:ls1-link1** command.

The system returns a result that indicates the name of the link and the status of the signaling link test. The following status responses are valid:

- TEST PASSED
- TEST FAILED—reasons for failure can be any of the following:
  - TEST TIMEOUT
  - LINK INACTIVE
  - LINKSET INACTIVE
  - ROUTE UNAVAILABLE
  - INVALID TEST PATTERN
  - INVALID SLC
  - FLOW CONTROL ON
  - UNKNOWN REASON
- COMPLETED hh:mm:ss
- TEST RUNNING

The following example shows a sample response to a signaling link test run on a link that is called ls1-link1:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:18:41
M  RTRV
   "ls1link1:TEST PASSED; COMPLETED 15:18:34"
```

Managing Japanese SS7 Signaling Route Tests

The following subsections detail the procedures that are used to manage the tests that can be run on a signaling route that is configured for Japanese SS7:

- Starting a Japanese SS7 Signaling Route Test, page 6-120
- Retrieving Results for a Japanese SS7 Signaling Route Test, page 6-120

Starting a Japanese SS7 Signaling Route Test

To start a signaling route test on a route that is configured for Japanese SS7, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-ss7-srt:*pt_code*:lset="*linkset*"** command.

Where:

- *pt_code*—MML name of an adjacent point code (APC) or destination point code (DPC) configured for Japanese SS7.
- *linkset*—MML name of a linkset that is associated with the specified destination.

For example, to start a signaling route test on a point code that is called dpc1, which is associated with a linkset called ls1, enter the **sta-ss7-srt:dpc1:lset="ls1"** command.

Retrieving Results for a Japanese SS7 Signaling Route Test

To retrieve the result of a Japanese SS7 signaling route test, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-ss7-srt:*pt_code*:lset="*linkset*"** command.

Where:

- *pt_code*—MML name of an adjacent point code (APC) or destination point code (DPC) configured for Japanese SS7.
- *linkset*—MML name of a linkset that is associated with the specified destination.

For example, to retrieve the results of a signaling route test that is run on a point code that is called dpc1, which is associated with a linkset called ls1, enter the **rtrv-ss7-srt:dpc1:lset="ls1"** command.

The system returns a result that indicates the name of the link and the status of the signaling route test. The following status responses are valid:

- TEST PASSED
- TEST FAILED—reasons for failure can be any of the following:
  - TEST TIMEOUT
  - LINK INACTIVE
  - LINKSET INACTIVE
  - ROUTE UNAVAILABLE
  - INVALID TEST PATTERN
  - INVALID SLC
  - FLOW CONTROL ON
  - UNKNOWN REASON
- COMPLETED hh:mm:ss
- TEST RUNNING

The following example shows a sample response to a signaling route test run on a point code that is called dpc1, which is associated with a linkset called ls1:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:20:09
M  RTRV
   "dpc1:TEST FAILED; TEST TIMEOUT; COMPLETED 15:20:01"
```

Verifying Proper Loading of a Dial Plan

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Search the active system log file, as described in the "Viewing System Logs" section on page 6-90, for logs that indicate that the dial plan was loaded incorrectly.

If the dial plan was not loaded correctly, reload the dial plan by saving and activate your dial plan again as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If there are no logs that indicate that the dial plan was loaded incorrectly, proceed to Step 3.

Step 3 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Verifying Configuration to Support Multiple Versions of SS7

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch and change directories to the /etc subdirectory by entering the `cd /opt/CiscoMGC/etc` UNIX command.

Step 3 Open the alarmCats.dat using a text editor, such as vi.

Step 4 The third column in the file indicates the severity level for each alarm. Verify that the severity level for the All C7 IP Links Fail alarm is set to 2. If the severity level is set correctly, the procedure is complete. Otherwise, proceed to Step 5 to begin the process of correcting your configuration.

Step 5 Set the severity level of the All C7 IP Links Fail alarm to 2.

Step 6 Save your changes and close the text editor.

Step 7 Repeat Step 2 through Step 6 on the standby Cisco PGW 2200 Softswitch.

Step 8 Stop the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 9 Restart the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 10 Perform a manual switchover from the active Cisco PGW 2200 Softswitch, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are sent to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Resolving an Association Alarm

When an alarm indicates a failure on an association, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 If this alarm occurs along with the LIF FAIL alarm on the failed destination address, proceed to Step 3. Otherwise, proceed to Step 5.

Step 3 Verify the functioning of the cabling between the Cisco PGW 2200 Softswitch and the destination address.

If the cables are functioning properly, proceed to Step 4.

If you find bad cables, replace them. If replacing a cable resolves the problem, the procedure is complete. Otherwise, proceed to Step 4.

Step 4 Verify if the associated Cisco switch is functioning.

If the switch is functioning properly, proceed to Step 5.

If the switch is not functioning properly, see the documentation for your switch for troubleshooting information. If that corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 5 Debug the IP connectivity between the Cisco PGW 2200 Softswitch and the associated external node.

If the IP connectivity is working correctly, proceed to Step 6.

If the IP connectivity is not working correctly, see the documentation for the external node to determine a method to identify and fix the IP connectivity problem. If that corrects the problem, the procedure is complete. Otherwise, proceed to Step 6.

Step 6 Determine the health of the associated external node.

If the external node is working correctly, proceed to Step 7.

If the external node is not operating properly, see the documentation for the external node for troubleshooting information. If that corrects the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Converting Stored and Sent Point Code Values

If you are troubleshooting signaling problems, you might encounter point code values displayed in hexadecimal or decimal. You must convert these values to understand which point code is affected, or the value that the Cisco PGW 2200 Softswitch sends. To convert and stored and sent point code values, complete the following steps:

Step 1 Convert the hexadecimal or decimal value to binary code.

For example, if you found a log message indicating a problem with a point code in a ITU SS7 connection that is identified with a hexadecimal value of 00:00:36:33, the converted binary value is 00000000000000000011011000110011.

Step 2 Remove the padding according the to point code address type that applies to the point code (14-, 16-, or 24-bit).

Note For an explanation of the point code address types, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

Continuing with the example, because the problem is with an ITU SS7 connection, the address should be 14 bits in length, resulting in the binary value 11011000110011.

Note If you are troubleshooting signaling problems for a Japanese ISUP connection, remember that the Cisco PGW 2200 Softswitch sends the higher-order bits first for those point codes. The fields for any sent point code value that you retrieve for a Japanese ISUP connection must be reversed while in its binary value, so that you can correctly identify the associated point code on the Cisco PGW 2200 Softswitch.

Step 3 Convert the binary code into decimal, using the correct point code format.

Note For an explanation of the point code formats, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

Concluding the example, since the problem is with an ITU SS7 connection and the value came from a Cisco PGW 2200 Softswitch log message, the address should use the ITU International point code format (3-bits/8-bits/3-bits, or 3-8-3), the resulting point code is 6.198.3.

Resolving Bearer Channel Connection Problems

Processing bearer channels is the primary responsibility of the Cisco PGW 2200 Softswitch. The main function of the Cisco PGW 2200 Softswitch is to ensure that an ingress bearer channel at one endpoint can connect successfully to an egress bearer channel at another endpoint.

The state of the bearer channels is often a good indicator of the overall operation of the system. You can find procedures for determining the state of bearer channels in the "Verifying CIC States" section on page 3-15.

The following sections contains procedures that are related to resolving problems associated with the Cisco PGW 2200 Softswitch platform bearer channel connections:

- Setting the Administrative State, page 6-124
- Querying Local and Remote CIC States, page 6-129
- Performing CIC Validation Tests, page 6-131
- Resolving ISDN D-Channel Discrepancies, page 6-137
- Unblocking CICs, page 6-139
- Resetting CICs, page 6-140
- Resolving Stuck CICs, page 6-141
- Auditing Call States, page 6-144

- Stopping Calls, page 6-144
- Auditing an MGCP Media Gateway, page 6-148
- Running a Manual Continuity Test, page 6-149
- Verifying Continuity Test Settings, page 6-149
- Media Gateway IP Destination or Link Out-of-Service, page 6-151
- Calls Fail at the Cisco PGW 2200 Softswitch, page 6-152
- 3.1 kHz (ISDN Category 3) Calls are Failing, page 6-153
- Calls are Misrouting, page 6-154

Setting the Administrative State

Use the **set-admin-state** MML command to change the administrative state of various components. The Cisco PGW 2200 Softswitch generates a log message every time you enter the **set-admin-state** command. The system also generates an alarm every time one issues the **set-admin-state** command at either the Cisco PGW 2200 Softswitch, media gateway, signaling service, or trunk group level.

The following sections present procedures that use the **set-admin-state** command:

- Setting the Administrative State of a Cisco PGW 2200 Softswitch, page 6-124
- Setting the Administrative State of a Media Gateway, page 6-125
- Setting the Administrative State of a Trunk Group, page 6-125
- Setting the Administrative State of a Signaling Service, page 6-126
- Setting the Administrative State of Spans, page 6-127
- Setting the Administrative State of CICs, page 6-128

Setting the Administrative State of a Cisco PGW 2200 Softswitch

To set the administrative state of a Cisco PGW 2200 Softswitch, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-admin-state:*mgc*:*state*** command.

Where:

- mgc—MML name of the Cisco PGW 2200 Softswitch.
- *state*—Administrative state that you want to set. The following states are valid:
  - lock—Makes all bearer channels unavailable for call processing. If the state is set to lock, active calls go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed.
  - unlock—Makes all bearer channels available for call processing. If the state is set to unlock, the Cisco PGW 2200 Softswitch becomes available. New calls are allowed to use the unlocked bearer channels.
  - reset—Clears local and remote blocking on all bearer channels and they take the blocking state of the remote side.

For example, to set the administrative state of a Cisco PGW 2200 Softswitch called mgc1 to unlock, enter the **set-admin-state:mgc1:unlock** command.

Step 2 Verify that the state of the Cisco PGW 2200 Softswitch changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of a Cisco PGW 2200 Softswitch" section on page 3-56.

Setting the Administrative State of a Media Gateway

To set the administrative state of an associated media gateway, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-admin-state:*gway*:*state*** command:

Where:

- gway—MML name of the media gateway.

Note Not all media gateway types are applicable. Supported types are CU, MUX, MGW, and AVM external nodes.

- *state*—Administrative state that you want to set. The following states are valid:
  - Lock—Makes all bearer channels that are associated with the media gateway unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.
  - Unlock—Makes all bearer channels that are associated with the media gateway available for call processing. If the state is set to unlock, the media gateway becomes available. New calls are allowed to use the affected bearer channels.
  - Reset—Clears local and remote blocking on the bearer channels that are associated with the media gateway and these bearer channels take the blocking state of the remote side.

For example, to set the administrative state of a media gateway called sfgway to lock, enter the **set-admin-state:sfgway:lock** command.

Step 2 Verify that the state of the media gateway changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of a Media Gateway" section on page 3-56.

Setting the Administrative State of a Trunk Group

To set the administrative state of a trunk group, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-admin-state:*trkgrp*:*state*** command.

Where:

- *trkgrp*—MML name of the trunk group.

Note Use this command only for time-division multiplexing (TDM) trunk groups. Allow the corresponding MML name for component type 0020.

- *state*—The administrative state. The following states are valid:
  - Lock—Makes all bearer channels that are associated with the trunk group unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.
  - Unlock—Makes all bearer channels that are associated with the trunk group available for call processing. If the state is set to unlock, the media gateway becomes available. New calls are allowed to use the affected bearer channels.
  - Reset—Clears local and remote blocking on the bearer channels that are associated with the trunk group and these bearer channels take the blocking state of remote side.

For example, to set the administrative state of a trunk group called trunkgrp1 to lock, enter the **`set-admin-state:trunkgrp1:lock`** command:

Step 2 Verify that the state of the trunk group changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of a Trunk Group" section on page 3-56.

Setting the Administrative State of a Signaling Service

To set the administrative state of a signaling service, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **`set-admin-state:`*`sig_srv`*`:`*`state`** command:

Where:

- *sig_srv*—The MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *state*—Administrative state. The following states are valid:
  - Lock—Makes all bearer channels that are associated with the signaling service unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.

– Unlock—Makes all bearer channels that are associated with the signaling service available for call processing. If the state is set to unlock, the media gateway becomes available. New calls are allowed to use the affected bearer channels.

For example, to set the administrative state of a signaling service called nassrv1 to lock, enter the **set-admin-state:nassrv1:lock** command:

Step 2 Verify that the state of the Cisco PGW 2200 Softswitch changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of a Signaling Service" section on page 3-57.

Setting the Administrative State of Spans

To set the administrative state of a single span, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-admin-state:*sig_srv*:span=*x*:*state*** command.

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.
- *state*—Administrative state. The following states are valid:
  - Lock—Makes all bearer channels that are associated with the span unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.
  - Unlock—Makes all bearer channels that are associated with the span available for call processing. If the state is set to unlock, the span becomes available. New calls are allowed to use the affected bearer channels.

For example, to set the administrative state of span number 2, associated with a signaling service called ss7svc1, to unlock, enter the **set-admin-state:ss7svc1:span=2:lock** command.

Step 2 Verify that the state of the bearer channels changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of Spans" section on page 3-57.

To set the administrative state of a bearer channel or a range of bearer channels in a span, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-admin-state:*sig_srv*:span=*x*,bc=*y*[,rng=*range*]:*state*** command:

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.
- *y*—Numeric value that identifies the non-ISUP bearer channel number.
- *range*—A value such that *y*+*range* is a valid bearer channel number. The administrative state for all bearer channels between *y* and *y*+*range* are retrieved.
- *state*—Administrative state. The following states are valid:
  - Lock—Makes the specified bearer channels unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.
  - Unlock—Makes the specified bearer channels available for call processing. If the state is set to unlock, the bearer channels become available. New calls are allowed to use the affected bearer channels.

For example, to set the administrative state of bearer channel numbers 2 through 6, associated with a signaling service called ss7svc1, to unlock, enter the **rtrv-admin-state:ss7svc1:span=2,bc=2,rng=5:unlock** command.

Step 2 Verify that the state of the bearer channels changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of Spans" section on page 3-57.

Setting the Administrative State of CICs

To set the administrative state of a CIC or a range of CICs, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **set-admin-state:*sig_srv*:cic=*number*[,rng=*range*]:*state*** command.

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *number*—Valid CIC number.
- *range*—Value such that *y*+*range* is a valid CIC number. The administrative state for all CICs between *y* and *y*+*range* are retrieved.
- *state*—Administrative state. The following states are valid:
  - Lock—Makes all bearer channels that are associated with the CICs unavailable for call processing. If the state is set to lock, active calls on the affected bearer channels go into pending state, where calls remain until either party voluntarily releases the call. New calls are disallowed on the affected bearer channels.
  - Unlock—Makes all bearer channels that are associated with the CICs available for call processing. If the state is set to unlock, the CICs become available. New calls are allowed to use the affected bearer channels.
  - Reset—Clears local and remote blocking on the bearer channels that are associated with the CICs and these bearer channels take the blocking state of the remote side.

For example, to set the administrative state of CICs 2 through 11, associated with a signaling service called ss7svc1, to lock, enter the **`set-admin-state:ss7svc1:cic=2,rng=9:lock`** command.

Step 2 Verify that the state of the Cisco PGW 2200 Softswitch changed by entering the **rtrv-admin-state** MML command, as described in the "Retrieving the Administrative State of CICs" section on page 3-59.

Querying Local and Remote CIC States

In the course of troubleshooting bearer channel problems, you might need to query the local and remote states of the related CICs to verify that they match. To query the local and remote states of a single CIC or a range of CICs, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **`query-cic:`*`sig_srv`*`:cic=`*`number`*`[,rng=`*`range`*`]`** command.

Where:

- *sig_srv*—MML name for the signaling service that is associated with the affected CICs.
- *number*—Number of the first CIC in the range of affected CICs.
- *range*—Number such that *number*+*range* is the number of the last CIC in the range of affected CICs. All CICs between *number* and *number*+*range* are displayed.

Note Not all SS7 variants support the querying of CICs. If you execute this command on a signaling service that is configured for an SS7 variant that does not support the querying of CICs, the system returns an error code, SABT, when the query operation times out.
See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for more information on the SABT error code.

Note You can configure the Cisco PGW 2200 Softswitch software to issue individual or group supervision messages for point codes that are associated with an ISUP signaling service. ISUP signaling services issue group supervision messages by default. If you configure an ISUP signaling service to issue individual supervision messages, you cannot use the *range* option cannot with this command. You can query CICs only one CIC number at a time for point codes that are associated with an ISUP signaling service configured to issue individual supervision messages.

For example, to query the state of CICs 20 through 24, associated with a signaling service called ss7svc1, enter the **query-cic:ss7svc1:cic=20,rng=4** command.

The system responds with a message like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M  RTRV
   "ss7svc1:CIC=20;LPST=IS;LSST=IDLE;RPST=IS;RSST=IDLE"
   "ss7svc1:CIC=21;LPST=IS;LSST=IDLE;RPST=IS;RSST=IDLE"
   "ss7svc1:CIC=22;LPST=IS;LSST=IDLE;RPST=IS;RSST=IDLE"
   "ss7svc1:CIC=23;LPST=IS;LSST=IDLE;RPST=IS;RSST=IDLE"
   "ss7svc1:CIC=24;LPST=OOS;LSST=IDLE_LOC_BLOC;RPST=IS;RSST=IDLE"
```

The response lists the local and remote primary and secondary states of the requested CICs. If the response indicates that the mismatch is because of a problem on the local side, you can attempt to resolve the state mismatch using the instructions in the "Resolving Local and Remote CIC State Mismatch" section on page 6-131. If the response indicates that the mismatch is because of a problem on the remote side, you must contact the personnel at the remote site to resolve the problem.

The valid values for the fields that are present in the response to this command are as follows:

- LPST and RPST—Local primary state and remote primary state
  - IS—In-Service.
  - OOS—Out-of-Service.
  - TRNS—Transient, the state is currently being changed
- LSST and RSST—Local secondary state and remote secondary state
  - N/A—Not available
  - UNEQUIPPED—Unequipped
  - IC_BUSY—Incoming is busy
  - IC_BUSY_LOC_BLOC—Incoming is busy, blocked locally
  - IC_BUSY_REM_BLOC—Incoming is busy, blocked remotely
  - IC_BUSY_BOTH_BLOC—Incoming is busy, blocked both remotely and locally
  - OG_BUSY—Outgoing is busy
  - OG_BUSY_LOC_BLOC—Outgoing is busy, blocked locally
  - OG_BUSY_REM_BLOC—Outgoing is busy, blocked remotely

- OG_BUSY_BOTH_BLOC—Outgoing is busy, blocked both remotely and locally
- IDLE—The circuit is idle, available for use
- IDLE_LOC_BLOC—Idle, blocked locally
- IDLE_REM_BLOC—Idle, blocked locally
- IDLE_BOTH_BLOC—Idle, blocked both locally and remotely

Resolving Local and Remote CIC State Mismatch

When the local and remote states for CICs do not match and the problem lies with the local CIC states, you can attempt to resolve the mismatch using an MML command, if your CICs are using ANSI SS7 signaling. To resolve a CIC state mismatch, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **query-cic:*sig_srv*:cic=*number*[,rng=*range*],rslv** command.

Where:

- *sig_srv*—MML name for the signaling service that is associated with the affected CICs.
- *number*—Number of the first CIC in the range of affected CICs.
- *range*—Number such that *number*+*range* is the number of the last CIC in the range of affected CICs. The system attempts to resolve state mismatches for all CICs between *number* and *number*+*range*.

Note Use the **rslv** option only if the system is using ANSI SS7 signaling. If the system uses ITU SS7 signaling and you enter this command, the system ignores the **rslv** option and performs a regular **query-cic** operation.

Note Configure the Cisco PGW 2200 Softswitch software to issue individual or group supervision messages for point codes that are associated with an ISUP signaling service. ISUP signaling services issue group supervision messages by default. Configure an ISUP signaling service to issue individual supervision messages, you cannot use the *range* option with this command. Resolve CIC state mismatches only one CIC number at a time for point codes that are associated with an ISUP signaling service configured to issue individual supervision messages.

If the command fails in its attempt to resolve the local and remote CIC state mismatch, collect system data according to the instructions in the "Collecting System Data for Cisco TAC" section on page 6-93 and contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Performing CIC Validation Tests

When performing initial turn-up of circuits or in troubleshooting certain problems with your bearer channels, perform a circuit validation test to verify that the properties defined in the Cisco PGW 2200 Softswitch for the affected bearer channels match the associated properties that are defined in the far-end exchange.

Note Perform CIC validation tests only on CICs associated with ANSI SS7-based DPCs.

To perform a circuit validation test, complete the following steps:

Step 1 Start an MML session on the active Cisco PGW 2200 Softswitch and validate the properties for a particular circuit identification code (CIC) using the **vld-cic:*dest_pc*:cic=*number*** command.

Where:

- *dest_pc*—MML name for the DPC associated with the affected CIC.
- *number*—Trunk identification number for the affected CIC.

If the circuit validation test is passed, the system returns a message like the following:

```
Media Gateway Controller - MGC-01 2000-03-07 09:35:19
 M  RTRV
    "dms100-pc:CIC=105,PASSED"
```

If the circuit validation test failed, the system returns a message like the following:

```
Media Gateway Controller - MGC-01 2000-03-07 09:35:19
 M  RTRV
    "dms100-pc:CIC=105,FAIL"
    LOC: GRP=DIG,SEIZ=EVEN,ALM=UNK,COT=NONE
    LOC: TRK=1003,A_CLLI=dms1003****,Z_CLLI=na*********
    REM: GRP=DIG,SEIZ=ODD,ALM=SOFT,COT=STAT
```

The fields in the LOC line are values that are associated with the Cisco PGW 2200 Softswitch. The fields in the REM line are values that are associated with the far-end exchange. The following list presents the valid values for the fields that the **vld-cid** command displays:

- GRP—Circuit group carrier indicator. The values in these fields should be the same in the LOC and REM lines. The following values are valid for this field:
  - UNK—Unknown circuit group carrier type
  - ANL—Analog circuit group carrier type
  - DIG—Digital circuit group carrier type
  - AND—Analog and digital circuit group carrier type
- SIEZ—Double seizing indicator. The values for this field in the LOC line should be logically opposite to the value for the REM line. The following values are valid for this field:
  - NONE—No circuit control. When one line is set to NONE, the other should be set to ALL.
  - ALL—All circuit control. When one line is set to ALL, the other should be set to NONE.
  - EVEN—Even circuit control. When one line is set to EVEN, the other should be set to ODD.
  - ODD—Odd circuit control. When one line is set to ODD, the other should be set to EVEN.
- ALM—Alarm carrier indicator. The values in these fields should be the same in the LOC and REM lines. The following values are valid for this field:
  - UNK—Unknown alarm carrier
  - SOFT—Software alarm carrier
  - HARD—Hardware alarm carrier

- COT—Continuity check requirements indicator. The values in these fields should be the same in the LOC and REM lines. The following values are valid for this field:
  - UNK—Unknown continuity check requirements
  - NONE—No continuity check requirements
  - STAT—Statistical continuity check requirements
  - PERC—Per call continuity check requirements
- TRK—Trunk number. This field is always displayed in the LOC line. It is only displayed in the REM line when the circuit identification names for the Cisco PGW 2200 Softswitch and the far-end exchange do not match.
- A_CLLI—Common language location identifier (CLLI) code for either the far-end exchange or the Cisco PGW 2200 Softswitch. The CLLIs for each are sorted alphabetically, and the A_CLLI field is populated with the CLLI that is found to be first. This field is always displayed in the LOC line. It is displayed in the REM line only when the CLLIs for the Cisco PGW 2200 Softswitch and the far-end exchange do not match.
- Z_CLLI—CLLI code for either the far-end exchange or the Cisco PGW 2200 Softswitch. The CLLIs for each are sorted alphabetically, and the Z_CLLI field is populated with the CLLI that is found to be second. This field is always displayed in the LOC line. It is displayed in the REM line only when the CLLIs for the Cisco PGW 2200 Softswitch and the far-end exchange do not match.

If the circuit validation test passes, proceed to Step 14.

If the circuit validation test fails, proceed to Step 2.

Step 2 Determine which settings are not correct by comparing the values that are displayed in the LOC field (from the Cisco PGW 2200 Softswitch) to values displayed in the REM field (from the associated far-end exchange), based on the field descriptions (previously described).

Step 3 Consult your provisioning records to determine whether the settings on the Cisco PGW 2200 Softswitch or the associated far-end exchange need to be modified to resolve the error.

To modify the settings on the Cisco PGW 2200 Softswitch to resolve the error, proceed to Step 4.

If the settings on the associated far-end exchange need to be modified to resolve the error, contact the provider that operates the switch and work with them to resolve the configuration error.

Step 4 Identify the signaling service that is associated with the affected DPC by issuing the **prov-rtrv:ss7path:"all"** command:

The system returns a message like the following:

```
mgc-01 - Media Gateway Controller 2000-09-26 15:55:17
M RTRV
"session=active:ss7path"
/*
NAME DPC MDO CUSTGRPIDCUSTGRPTBLSIDE
---- --- --- ----------------------
ss7am401aam401a-pcANSISS7_STANDARD00000101network
ss7am702bam702b-pcANSISS7_STANDARD00000101network
ss7inet1inetsp1-pcANSISS7_STANDARD00000101network
ss7am408aam408a-pcANSISS7_STANDARD00000101network
ss7am408bam408b-pcANSISS7_STANDARD00000101network
ss7inet2inetsp2-pcANSISS7_STANDARD00000101network
ss7dmsdms100-pcANSISS7_STANDARD00000101network
ss7am401bam401b-pcANSISS7_STANDARD00000101network
ss7am608bam608b-pcANSISS7_STANDARD00000101network
ss7sc2200sc2200-pcANSISS7_STANDARD00000101network
```

The response lists the SS7 signaling services and their associated DPCs. Search for the DPC associated with the trunk to identify the name of the SS7 signaling service. In the example, **dms100-pc** is the name of the DPC associated with the trunk. The SS7 signaling service names are in the column to the immediate left of the DPCs, so the name of the associated SS7 signaling service in the example is **ss7dms**.

Step 5 Identify the MML names of the mismatched settings for the affected signaling service that was found in Step 4 by using the **prov-rtrv:sigsvcprop:name="*sig_serv*"** command.

Where:

sig_serv—MML name of the affected signaling service.

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2000-09-26 15:57:29
M RTRV
"session=active:sigsvcprop"
/*
adjDestinations = 16
AlarmCarrier = 0
BothwayWorking = 1
CctGrpCarrier = 2
CGBA2 = 0
CircHopCount = 0
CLIPEss = 0
CotInTone = 2010
CotOutTone = 2010
CotPercentage = 0
dialogRange = 0
ExtCOT = Loop
ForwardCLIinIAM = 1
ForwardSegmentedNEED = 1
GLARE = 0
GRA2 = 0
GRSEnabled = false
InternationalPrefix = 0
layerRetries = 2
layerTimer = 10
maxMessageLength = 250
mtp3Queue = 1024
NationalPrefix = 0
NatureOfAddrHandling = 0
Normalization = 0
OMaxDigits = 24
OMinDigits = 0
OOverlap = 0
OwnClli = na
RedirMax = 3
restartTimer = 10
RoutePref = 0
sendAfterRestart = 16
slsTimer = 300
srtTimer = 300
sstTimer = 300
standard = ANSI92
SwitchID = 0
TMaxDigits = 24
TMinDigits = 0
TOverlap = 0
variant = SS7-ANSI
VOIPPrefix = 0
```

You can map the preceding response to the circuit validation test in Step 1, as presented in the following list:

- CctGrpCarrier—Value in this field maps to the value in the GRP field, as follows:
  - 0—Equal to UNK (unknown carrier) in the GRP field.
  - 1—Equal to ANL (analog carrier) in the GRP field.
  - 2—Equal to DIG (digital carrier) in the GRP field.
  - 3—Equal to AND (analog and diglossia carrier) in the GRP field.
- Glare—Value in this field maps to the value in the SEIZ field, as follows:
  - 0 or 3—Equal to NONE (no circuit control) in the SEIZ field.
  - 1—Equal to ALL (all circuit control) in the SEIZ field.
  - 2—Equal to ODD (odd circuit control) in the SEIZ field when the OPC is less than the associated DPC. Equal to EVEN (even circuit control) in the SEIZ field when the OPC is greater than the associated DPC.
- AlarmCarrier—Value in this field maps to the value in the ALM field, as follows:
  - 0—Equal to UNK (unknown) in the ALM field.
  - 1—Equal to SOFT (software handling) in the ALM field.
  - 2—Equal to HARD (hardware handling) in the ALM field.
- CotPercentage and ExtCOT—Values in this field maps to the value in the COT field, as follows:
  - CotPercentage is undefined and ExtCOT is not set to *Loop* or *Transponder*—Equal to UNK (unknown continuity check requirements) in the COT field.
  - CotPercentage is set to any value and ExtCOT is not set to *Loop* or *Transponder*—Equal to NONE (no continuity check requirements) in the COT field.
  - CotPercentage is greater than 0 and less than 100 and ExtCOT is set to *Loop* or *Transponder*—Equal to STAT (statistical continuity check requirements) in the COT field.
  - CotPercentage is set to 100 and ExtCOT is set to *Loop* or *Transponder*—Equal to PERC (per call continuity check requirements) in the COT field.

Step 6 Start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 7 Modify the appropriate signaling service settings using the **prov-ed:sigsvcprop:name="*sig_svc*",*param_name*="*param_value*",*param_name*="*param_value*",...** command.

Where:

- sig_svc—MML name for the affected signaling service.
- *param_name*—MML name for a mismatched setting.
- *param_value*—Correct value for a mismatched setting.

For example, to change the settings for the COT to per call and seizing (glare) to no circuit control for the ss7dms signaling service, enter the **prov-ed:sigsvcprop:name="ss7dms",ExtCOT="Loop", CotPercentage="100",GLARE="0"** command:

Step 8 If the Cisco PGW 2200 Softswitch is provisioned for a switched environment and you need to modify the COT or seizing (glare) properties, modify the trunk group properties.

If you must modify the trunk group properties, proceed to Step 9.

If you do not need to modify the trunk group properties, proceed to Step 12.

Step 9 Identify the trunk group that is associated with the affected DPC using the **prov-rtrv:trnkgrp:svc="*sig_serv*"** command:

Where:

sig_serv—MML name of the SS7 signaling service that was identified in Step 4.

The system returns a message like the following:

```
MGC-01 - Media Gateway Controller 2000-09-26 15:55:17
M RTRV
"session=active:trnkgrp"
/*
NAME CLLI SVCTYPESELSEQQABLE
---- --- --- -----------------
1003DMS100CLLIss7dmsTDM_ISUPASCN
```

The response lists the trunk group that is associated with the affected SS7 signaling service. The MML name of the trunk group is displayed in the NAME column. In the example, **ss7dms** is the name of the SS7 signaling service that is associated with the trunk. The trunk group names are in the first column, so the name of the associated trunk group in the example is **1003**.

Step 10 Identify the MML names of the mismatched settings for the affected trunk group that was found in Step 9 by using the **prov-rtrv:trnkgrpprop:name="*trnk_grp*"** command:

Where:

trnk_grp—MML name of the affected trunk group.

The system returns a message like the following:

```
mgc-01 - Media Gateway Controller 2000-09-26 15:57:29
M RTRV
"session=active:trnkgrpprop"
/*
CarrierIdentity = 0333
CLLI = GR31764KB5
CompressionType = 1
CotPercentage = 1
CustGrpId = V123
EchoCanRequired = 0
ExtCOT = Loop
GLARE = 2
Npa = 919
RingNoAnswer = 100000
SatelliteInd = 0
ScreenFailAction = 0
*/
```

Step 11 Modify the appropriate trunk group settings by using the **prov-ed:trnkgrp:name="*trnk_grp*",*param_name*="*param_value*",*param_name*="*param_value*",...** command:

Where:

- *trnk_grp*—MML name for the affected trunk group.
- *param_name*—MML name for a mismatched setting.
- *param_value*—Correct value for a mismatched setting.

Note The values for the COT or seizing properties that are entered here should match the values that were set in Step 7.

For example, to change the settings for the COT to per call and seizing (glare) to no circuit control for the trnkgrpdms trunk group, enter the **prov-ed:ztrnkgrp:name="trnkgrpdms",ExtCOT="Loop", CotPercentage="100",GLARE="0"** command:

Step 12 Activate your new configuration as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 13 Return to Step 1 and enter the **vld-cic** command again.

If the response indicates that the test passed, proceed to Step 14.

If the response indicates that the test failed, resume performing this procedure from Step 2 and modify the mismatched settings that were identified in the latest command response.

Step 14 Repeat Step 1 through Step 13 for each additional CIC that you want to test.

Resolving ISDN D-Channel Discrepancies

When there is a mismatch between the D-channels that are configured on the Cisco PGW 2200 Softswitch and the D-channels that are configured on the associated media gateway, the system generates an ISDN log message. To resolve the log message, complete the following steps:

Step 1 Enter the **cd $BASEDIR/etc** command at the active Cisco PGW 2200 Softswitch to change directories.

Step 2 Determine the component IDs associated with the D-channel number identified in the log text by searching for the D-channel number in the data files.

For example, if the log message contains the following text:

```
PROT_ERR_ISDN:Error message from ISDN:Receive MGMT_ERROR_IND for set 1, channel 2854
```

The D-channel number in the example is **2854**. Therefore, search for occurrences of D-channel **2854** in the data files.

Enter the **grep *d_num* *.dat** command to search the data files for the identified D-channel number:

Where *d_num* is the D-channel number that is identified in the alarm message.

The system returns a message like the following:

```
sigChanDev.dat:001002bd  00160002  1  0034015e  00030011  00060001  2854
sigChanDev.dat:001002be  00160002  1  0034015e  00030011  00060002  2854
```

The response lists the data files in which the D-channel number was found, along with the associated properties. In the preceding example, the D-channel number, **2854**, was found twice in the **sigChanDev.dat** file. The component IDs are in the column immediately following the data filename. So, in this example, the component IDs are **001002bd** and **001002be**.

Step 3 Determine the MML name of an IP link that is associated with one of the component IDs you identified in Step 2 by using the **grep *comp_ID* components.dat** command.

Where:

comp_ID—Component ID identified in Step 2.

The system returns a message like the following:

```
001002bd  0034015e  "bh531-31"              "IP link-backhaul svc mgx8260 EAST"
```

The response lists the properties that are associated with the selected component ID. The MML name for the IP link is in the third column in the response. In the preceding example, **"bh531-31"** is the MML name for the IP link.

Step 4 Repeat Step 3 for each component ID identified in Step 2.

Step 5 Start an MML session from the active Cisco PGW 2200 Softswitch and enter the **prov-rtrv:iplnk:name="*ip_link*"** command to determine the MML name for the signaling service that is associated with the IP links identified in Step 3.

Where:

ip_link—MML name for an IP link that was identified in Step 3.

The system returns a message like the following:

```
Media Gateway Controller 2000-06-08 13:49:53
 M  RTRV
    "session=active:iplnk"
    /*
 NAME = bh531-31
 DESC = IP link-backhaul svc mgx8260 EAST
 SVC = bh531-3
 IF = enif1
 IPADDR = IP_Addr1
 PORT = 7007
 PEERADDR = 10.15.26.20
 PEERPORT = 7007
 PRI = 1
 SIGSLOT = 11
 SIGPORT = 38
    */
```

The response lists the properties that are associated with your selected IP link. The MML name for the signaling service that is associated with the link is in the SVC field. In the preceding example, **bh531-3** is the MML name for the signaling service. Note the values in the SIGSLOT and SIGPORT fields. Use these values later to determine whether the D-channel is defined on the media gateway.

Step 6 Enter the **rtrv-dest:*sig_serv*** command to retrieve the properties for the signaling service that was identified in Step 5.

Where *sig_serv* is the MML name for a signaling service that was identified in Step 5.

The system returns a message like the following:

```
Media Gateway Controller 2000-06-08 13:50:26
 M  RTRV
    "bh531-3:PKG=ISDNPRI,ASSOC=SWITCHED,PST=OOS,SST=UND"
```

Step 7 Log into the associated media gateway and determine whether the D-channel is defined. See the documentation for the media gateway for information on how to verify whether the D-channel is defined.

For example, to determine whether a D-channel is defined for a Cisco MGX8260 media gateway, enter the **lsdchan 12.39** command.

The values, **12.39**, specify the D-channel. These numbers are determined by adding 1 to the SIGSLOT and SIGPORT values identified in Step 5.

The media gateway responds with a message that indicates whether the D-channel is defined.

Step 8 Consult your provisioning records and determine whether the identified D-channel should exist.

If your provisioning records indicate that the D-channel should exist, proceed to Step 9.

If your provisioning records indicate that the D-channel should *not* exist, proceed to Step 10.

Step 9 Define the D-channel on the associated media gateway. See the documentation for the media gateway for information on how to define a D-channel.

The procedure is finished.

Step 10 Start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 11 Delete the appropriate D-channels using the **prov-dlt:iplnk:name="*ip_link*",...** command.

Where:

ip_link—MML names for an IP link that was identified in Step 3.

For example, to delete a D-channel that is named bh531-31, enter the **prov-dlt:iplink:name="bh531-31"** command.

Step 12 Delete the signaling service that is associated with the D-channel using the **prov-dlt:ipfaspath:name="*sig_serv*"** command.

Where:

sig_serv—MML name for a signaling service that was identified in Step 5.

For example, to delete a signaling service that is named bh531-3, enter the **prov-dlt:ipfaspath:name="bh531-3"** command.

Step 13 Activate your new configuration as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Unblocking CICs

You may need to unblock a CIC or a range of CICs on the Cisco PGW 2200 Softswitch. There are two types of blocking on a CIC, local and remote.

Unblocking Locally Blocked CICs

To unblock a single CIC, log in to your active Cisco PGW 2200 Softswitch, start an MML session and enter the **unblk-cic:*sig_svc*:CIC=*number*** command.

Where:

- *sig_svc*—MML name of the signaling service that is associated with the CICs that you want to unblock.
- *number*—Number of the affected CIC.

For example, to unblock CIC number 2, which is associated with a signaling service called ss7svc1, enter the **unblk-cic:ss7svc1:CIC=2** command.

To unblock a range of CICs, log in to your active Cisco PGW 2200 Softswitch, start an MML session, and enter the **unblk-cic:*sig_svc*:CIC=*number*,RNG=*range*** command.

Where:

- *sig_svc*—MML name of a signaling service that is associated with the CICs you want to unblock.
- *number*—Number of the first CIC in the range of CICs you want to unblock.
- *range*—Number such that *number*+*range* is the number of the last CIC in the range of affected CICs. All CICs between *number* and *number*+*range* are displayed.

Note You can configure the Cisco PGW 2200 Softswitch software to issue individual or group supervision messages for point codes that are associated with an ISUP signaling service. ISUP signaling services issue group supervision messages by default. If you configure an ISUP signaling service to issue individual supervision messages, specifying the *range* option causes the system to issue individual supervision messages for each CIC in the range, instead a single group supervision message.

For example, to unblock CIC number 1 through 20, which are associated with a signaling service called ss7svc1, enter the **unblk-cic:ss7svc1:cic=1,rng=19** command.

To verify that the CICs are successfully unblocked, retrieve the status of the affected CICs as described in the "Verifying CIC States" section on page 3-15. If the CICs are still blocked, see the "Resetting CICs" section on page 6-140.

Unblocking Remotely Blocked CICs

Generally, you cannot unblock a CIC that was blocked remotely, because the block was set on the far-end. However, in some instances, a remotely blocked CIC is misreported. You can fix this problem by resetting the CIC as described in the "Resetting CICs" section on page 6-140.

Resetting CICs

When trying to clear a blocked CIC or range of CICs, you might need to perform a reset on the affected CICs by issuing the **reset-cic** MML command.

Note The **reset-cic** MML command is not supported for signaling services that use variants of the BTNUP protocol.

To reset a single CIC, log in to your active Cisco PGW 2200 Softswitch, start an MML session and enter the **reset-cic:*sig_srv*:CIC=*number*** command.

Where:

- *sig_srv*—MML name of the signaling service that is associated with the CICs to be reset.
- *number*—Number of the affected CIC.

For example, to reset CIC number 2, which is associated with a signaling service called ss7svc1, enter the **reset-cic:ss7svc1:CIC=2** command.

To reset a range of CICs, log in to your active Cisco PGW 2200 Softswitch, start an MML session, and enter the **reset-cic:*sig_srv*:CIC=*number*,RNG=*range*** command.

Where:

- *sig_srv*—MML name of a signaling service that is associated with the CICs you want to reset.
- *number*—Number of the first CIC in the range of CICs you want to reset.
- *range*—Number such that *number*+*range* is the number of the last CIC in the range of affected CICs. All CICs between *number* and *number*+*range* are displayed.

Note You can configure the Cisco PGW 2200 Softswitch software to issue individual or group supervision messages for point codes that are associated with an ISUP signaling service. ISUP signaling services issue group supervision messages by default. If you configure an ISUP signaling service to issue individual supervision messages, specifying the *range* option causes the system to issue individual supervision messages for each CIC in the range, instead of a single group supervision message.

For example, to reset CICs number 1 through 20, which are associated with a signaling service called ss7svc1, enter the **`reset-cic:ss7svc1:cic=1,rng=19`** command:

To verify that the CICs are successfully reset, retrieve the status of the affected CICs as described in the "Verifying CIC States" section on page 3-15. If the CICs are still blocked, see the "Resolving Stuck CICs" section on page 6-141.

Resolving Stuck CICs

A CIC is stuck or hung when one or more bearer channels that are associated with a single call instance refuse to return to the idle call state, despite attempts to manually clearit by issuing the **reset-cic** MML command. Usually, a CIC is stuck when transient network glitches or configuration errors trigger protocol state machine errors. Typically these conditions result in a mismatch between the call state of a CIC on the Cisco PGW 2200 Softswitch and the call state for the associated span and bearer channel (also known as *time slot*) on the media gateway.

The Cisco PGW 2200 Softswitch can automatically detect and terminate stuck CICs. The system runs an audit cron job once a day that verifies, using the **sta-aud** MML command, that the call states for the CICs on the Cisco PGW 2200 Softswitch match the associated states for the spans and bearer channels on the media gateway. If the audit finds that the Cisco PGW 2200 Softswitch call states on a CIC show that a call is in progress while the associated media gateway span and bearer channel states are idle, the system attempts to release the identified CIC by issuing the **stp-call** MML command. The **stp-call** MML command monitors for the release of the CIC. If the CIC is not released within 1 to 2 minutes, the system forcefully releases the CIC. When a CIC is forcefully released, a minimal CDR is written, with a cause of Temporary Failure.

Note If you believe CICs are stuck CICs, and do not want to wait for the periodic audit cron job to run, or if the audit cron job seems unable to clear the CICs, perform the steps that are identified in the "Manually Resolving Stuck CICs" section on page 6-142.

Note The format of the CDR depends upon your configuration of the associated XECfgParm.dat parameters. For more information on XECfgParm.dat configuration, see *Cisco PGW 2200 Softswitch Release 9 Software Installation and Configuration Guide*. For more information on CDRs, see *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*.

To run the audit cron job more than once a day, increase the frequency of the audit in the mgcusr crontab entry. You must have system administration authority to use crontab. For more information on crontab, enter the UNIX **man crontab** command on the Cisco PGW 2200 Softswitch.

Note The Cisco PGW 2200 Softswitch does not run the audit cron job when the CPU load of the call engine is greater than the limit set in the XECfgParm.dat file. For more information on XECfgParm.dat configuration, see *Cisco PGW 2200 Softswitch Release 9 Software Installation and Configuration Guide*.

Manually Resolving Stuck CICs

If you want to resolve stuck CICs manually, perform the follow steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Set the logging level of the call engine process (eng-01) to *info* by using the procedure that is described in the "Changing the Log Level for Processes" section on page 6-91.

Step 3 Perform a call state audit by using the procedure that is described in the "Auditing Call States" section on page 6-144.

When you search the active system log file, look for a CP_INFO_CHAN_STATE message containing the following text:

```
NAS is idle, SC is busy
```

The following example shows the log message:

```
Fri May 25 13:27:45:384 2001 | engine (PID 14217) <Info>
CP_INFO_CHAN_STATE:Mismatch in channel state, NAS is idle, SC is busy, span 0, channel 2
```

If you find this kind of CP_INFO_CHAN_STATE message in the active system log file, proceed to Step 4. Otherwise, proceed to Step 16.

Step 4 There should be two associated CP_ERR_AUEP messages, one containing information on the affected span and bearer channel and another containing information on the affected CIC.

Search the active system log file for a CP_ERR_AUEP message that contains the following text:

```
Audit:failed to audit end point
```

The following example shows these messages:

```
Fri May 25 13:27:45:384 2001 | engine (PID 14217) <Error>
CP_ERR_AUEP:Audit:failed to audit end point nassvc1[00140001]/0/2

Fri May 25 13:27:45:384 2001 | engine (PID 14217) <Error>
CP_ERR_AUEP:Audit:failed to audit end point sigsrv1[00130002]/ffff/2
```

In the first message, which contains information on the affected span and bearer channel, the text that immediately follows the word "point" identifies the following:

- MML name of the media gateway destination that is associated with the affected span and bearer channel (nasssvc1 in the example).
- Internal hexadecimal code that is associated with the identified media gateway destination (00140001 in the example). This number appears in brackets.
- Affected span number, in hexadecimal (0 in the example).
- Affected bearer channel number, in hexadecimal (2 in the example).

In the second message, which contains information on the affected CIC, the text that immediately follows the word “point” identifies the following:

- MML name of the signaling service that is associated with the affected CIC (sigsrv1 in the example).
- Internal hexadecimal code that is associated with the identified signaling service (00130002 in the example). This number appears in brackets.
- Affected span number, in hexadecimal (ffff in the example). This field for this type of message is always set to “ffff”, because there is no correlation to span in SS7 networks.
- Affected CIC number, in hexadecimal (2 in the example).

Step 5 Convert the hexadecimal values for the span, bearer channel, and CIC into decimal values.

Step 6 Refer to the information gathered in Step 4 and Step 5 and stop the call on an affected CIC for its associated signaling service. Use the procedure that is described in the “Stopping Calls on CICs” section on page 6-147.

Step 7 Refer to the information gathered in Step 4and Step 5, stop the call on an affected span and bearer channel for its associated media gateway destination, by using the procedure that is described in the “Stopping Calls on Spans” section on page 6-146.

Step 8 Reset the affected CIC using the procedure in the “Resetting CICs” section on page 6-140.

Step 9 Repeat Step 3 through Step 8. Search for additional sets of affected CICs, spans, and bearer channels, until you address all of the stuck CICs identified by the call state audit.

Step 10 Repeat Step 3 and Step 4. Perform a second call state audit and search the active system log file to determine whether the previously identified CICs are still stuck.

If the previously identified CICs are still stuck, proceed to Step 11. Otherwise, proceed to Step 14.

Step 11 Forcefully end the call on the signaling services and CICs identified in Step 4 by entering the **kill-call:*sig_srv*:cic=*num*,confirm** command.

Caution The **kill-call** MML command forcibly ends calls locally. It does not send any SS7 messages to the far-end. Enter the **Kill-call** command only to clear stuck CICs that you cannot clear by issuing the **reset-cic** or **stp-call** MML commands.

Where:

- *sig_srv*—MML name of the signaling service that is identified in Step 4.
- *num*—Number of the stuck CIC identified in Step 4.

For example, to forcefully stop a call on CIC 215, which is associated with a signaling service called sigsrv1, enter the **kill-call:sigsrv1:cic=215,confirm** command.

Repeat this step for each CIC you have identified as being stuck.

Step 12 Forcefully end the call on the signaling service, spans, and bearer channels that were identified in Step 4 by entering the **kill-call:*sig_srv*:span=*span_num*,bc=*bear_chan*,confirm** command.

Where:

- *sig_srv*—MML name of the signaling service that is identified in Step 4.
- *span_num*—Number of the span that was identified in Step 4.
- *bear_chan*—Number of the stuck bearer channel that was identified in Step 4.

For example, to forcefully stop a call on bearer channel 2, which is on span 2, and is associated with a signaling service called nassvc1, enter the **kill-call:nassvc1:span=2,bc=2,confirm** command.

Repeat this step for each bearer channel you have identified as being stuck.

Step 13 Repeat Step 3 and Step 4. Perform a third call state audit and search the active system log file to determine whether the previously identified CICs are still stuck.

If the previously identified CICs are no longer stuck, proceed to Step 14. If these CICs are still stuck, proceed to Step 15.

Step 14 Set the logging level of the call engine (eng-01) to *err*, by using the procedure that is described in the "Changing the Log Level for Processes" section on page 6-91.

Step 15 Perform a call trace as described in the "Performing a Call Trace" section on page 6-156.

Step 16 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Auditing Call States

To run a call state audit, which compares the call states of the CICs on the Cisco PGW 2200 Softswitch with the associated states of the spans and bearer channels on the media gateway, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-aud** command.

Note The Cisco PGW 2200 Softswitch does not indicate when the **sta-aud** MML command completes its call state audit process. Wait a few minutes before proceeding to the next step.

The call state audit sends results to the active system log file.

Step 3 View the active system log file according to the instructions in the "Viewing System Logs" section on page 6-90. If you see any call state mismatch logs in the active system log file, contact the Cisco TAC for assistance in resolving the call state mismatch. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for more information about contacting the Cisco TAC.

Step 4 When you finished auditing the call states, enter the **stp-aud** command:

Stopping Calls

Enter the **stp-call** MML command to stop calls gracefully on all traffic channels that are associated with a specified system resource. The following sections describe the **stp-call** MML command:

- Stopping Calls on a Cisco PGW 2200 Softswitch, page 6-145
- Stopping Calls on a Media Gateway, page 6-145
- Stopping Calls on a Trunk Group, page 6-145
- Stopping Calls on a Signaling Service, page 6-145

- Stopping Calls on Spans, page 6-146
- Stopping Calls on CICs, page 6-147

Stopping Calls on a Cisco PGW 2200 Softswitch

To stop all active calls on all traffic channels on a Cisco PGW 2200 Softswitch, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*mgc*,confirm** command.

Where:

mgc— MML name of the desired Cisco PGW 2200 Softswitch.

For example, to stop all active calls on all traffic channels on a Cisco PGW 2200 Softswitch called mgc1, enter the **stp-call:mgc1,confirm** command.

Stopping Calls on a Media Gateway

To stop all active calls on all traffic channels on a media gateway, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*gway*,confirm** command.

Where:

gway—MML name of the desired media gateway.

Note This procedure does not apply to all media gateway types. Supported types are CU, MUX, MGW, and AVM external nodes.

For example, to stop all active calls on all traffic channels on a media gateway called sfgway, enter the **stp-call:sfgway,confirm** command.

Stopping Calls on a Trunk Group

To stop all active calls on all traffic channels that are associated with a trunk group, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*trkgrp*,confirm** command.

Where:

trkgrp—MML name of the trunk group.

Note You can use this command only for TDM trunk groups.

For example, to stop all active calls on all traffic channels that are associated with a trunk group called trunkgrp1, enter the **stp-call:trunkgrp1,confirm** command.

Stopping Calls on a Signaling Service

To stop all active calls on all traffic channels that are associated with a signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*sig_srv*,confirm** command.

Where:

sig_srv—MML name of the desired signaling service. The following signaling service types are valid for this command:

- In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
- In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
- In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
- Signaling service or routeset that is associated with a DPC.
- EISUP signaling service.

For example, to stop all active calls on all traffic channels that are associated with a signaling service called nassrv1, enter the **stp-call:nassrv1,confirm** command.

Stopping Calls on Spans

To stop all active calls on all bearer channels that are associated with a single span, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*sig_srv*:span=*x*,confirm** command.

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.

For example, to stop all active calls on all bearer channels on a signaling service that is called ss7svc1 associated with span number 1, enter the **stp-call:ss7svc1:span=1,confirm** command.

To stop all active calls on a bearer channel, or a range of bearer channels, for a span that is associated with a signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*sig_srv*:span=*x*,bc=*y*[,rng=*range*],confirm** command.

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *x*—16-bit value that identifies an ISDN/PRI physical cable.
- *y*—Numeric value that identifies the non-ISUP bearer channel number.
- *range*—Value such that *y*+*range* is a valid bearer channel number. The administrative state for all bearer channels between *y* and *y*+*range* are retrieved.

For example, to stop all active calls on all bearer channel numbers 2 through 6, associated with a signaling service called ss7svc1, enter the **stp-call:ss7svc1:span=2,bc=2,rng=5,confirm** command.

Stopping Calls on CICs

To stop all active calls on a CIC, or a range of CICs, associated with a signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-call:*sig_srv*:cic=*number*[,rng=*range*],confirm** command.

Where:

- *sig_srv*—MML name of the signaling service. The following signaling service types are valid for this command:
  - In-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - In-band TDM signaling up to the media gateway and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->media gateway<-NI2/IP-> Cisco PGW 2200 Softswitch).
  - Signaling service or routeset that is associated with a DPC.
  - EISUP signaling service.
- *number*—Valid CIC number.
- *range*—Value such that *y*+*range* is a valid bearer channel number. The administrative state for all bearer channels between *y* and *y*+*range* are retrieved.

For example, to stop all active calls on CICs 2 through 11, associated with a signaling service called ss7svc1, enter the **stp-call:ss7svc1:cic=2,rng=9,confirm** command.

Auditing an MGCP Media Gateway

You can audit an MGCP media gateway from the Cisco PGW 2200 Softswitch. The following sections describe the procedure to audit an MGCP media gateway:

- Starting an MGCP Media Gateway Audit, page 6-148
- Retrieving an MGCP Media Gateway Audit, page 6-148

Starting an MGCP Media Gateway Audit

You can run an audit on a single MGCP media gateway, or on all the provisioned MGCP media gateways. The Cisco PGW 2200 Softswitch does not prompt you to indicate when the audit is complete. Please wait a few moments before retrieving the audit results as described in the "Retrieving an MGCP Media Gateway Audit" section on page 6-148.

To run an audit on a single MGCP media gateway, log on to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-aud-gw:*MGCP_sig_srv*** command.

Where:

MGCP_sig_srv—MML name of the MGCP signaling service that is associated with the MGCP media gateway.

For example, to start an audit on an MGCP media gateway that is associated with an MGCP signaling service called T-1-16, enter the **sta-aud-gw:T-1-16** command:

To run an audit on all the MGCP media gateways, log on to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-aud-gw:all** command.

Retrieving an MGCP Media Gateway Audit

You can retrieve an audit for a single MGCP media gateway, or for audits on all the MGCP media gateways. To retrieve an audit for a single MGCP media gateway, log on to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-aud-gw:*MGCP_sig_srv*** command.

Where:

MGCP_sig_srv—MML name of the MGCP signaling service that is associated with the MGCP media gateway.

For example, to retrieve an audit on an MGCP media gateway that is associated with an MGCP signaling service called T-1-16, enter the **rtrv-aud-gw:T-1-16** command.

The system returns a response like the following:

```
Media Gateway Controller  - MGC-01 2000-01-12 15:19:51
M COMPLD
   "SP1-MGCP1:Audit gw received at 2000-01-12 15:19:51
Audit GW PASSED
pass pn
pass pt - not alarmed
pass sl - not alarmed
pass nl
pass bp
pass cp
pass rp
pass nb
pass uc
pass ic
pass us
```

```
pass is"
```

The response indicates whether the audit passed or failed. If the audit failed, see the documentation for the associated MGCP media gateway for more information on troubleshooting the identified problem.

To retrieve an audit that is run on all the MGCP media gateways, log on to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-aud-gw:all** command.

The system returns a response like the one shown previously, with a set of data for every MGCP media gateway that is associated with your system.

Running a Manual Continuity Test

To run a manual continuity test (COT) on a specified remote switch CIC, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **tst-cot:*sig_srv*:cic=*number*** command.

Where:

- *sig_srv*—MML name of the signaling service that is associated with the CIC that you want to test.
- *number*—Identification number of the CIC that you want to test.

For example, to run a manual COT on CIC number 5 of a signaling service named sigsrv1, you would enter the **tst-cot:sigsrv1:cic=5** command.

If the manual COT test fails, verify the COT settings for the Cisco PGW 2200 Softswitch and the associated media gateway, as described in the "Verifying Continuity Test Settings" section on page 6-149.

Verifying Continuity Test Settings

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the COT properties for the associated SS7 signaling service or trunk group are correct by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **prov-rtrv:*component*:name="*comp_name*"** command.

Where:

- *component*—MML component type name for the SS7 signaling service or trunk group properties. Enter one of the following:
  - sigsvcprop—Component type for SS7 signaling service properties.
  - trnkgrpprop—Component type for trunk group properties.
- *comp_name*—MML name for the affected SS7 signaling service or trunk group.

For example, if you wanted to verify the properties for an SS7 signaling service that is called **ss7svc1**, enter the **prov-rtrv:sigsvcprop:name="ss7svc1"** command:

If the system is properly configured to use a dial plan, the system returns a response like the following:

```
MGC-01 - Media Gateway Controller 2001-06-01 10:09:47
M  RTRV
   "session=active:sigsvcprop"
   /*
adjDestinations = 16
AlarmCarrier = 0
BothwayWorking = 1
CctGrpCarrier = 2
CGBA2 = 0
CircHopCount = 0
CLIPEss = 0
CotInTone = 2010
CotOutTone = 2010
CotPercentage = 0
CustGrpId=2222
dialogRange = 0
ExtCOT = Loop
ForwardCLIinIAM = 1
ForwardSegmentedNEED = 1
                .
        .
        .
```

Step 3 If your settings for the highlighted properties match what is displayed, proceed to Step 6. Otherwise, you must modify the COT settings on the Cisco PGW 2200 Softswitch. To begin modifying the COT settings, start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 4 Enter the **prov-ed:*component*:name="*comp_name*",*cot_prop=value*,*cot_prop=value*,...** command to modify the COT settings on the Cisco PGW 2200 Softswitch.

Where:

- *component*—MML component type name for the SS7 signaling service or trunk group properties. Enter one of the following:
  - ss7path—Component type for SS7 signaling services.
  - trnkgrp—Component type for trunk groups.
- *comp_name*—MML name for the affected SS7 signaling service or trunk group.
- *cot_prop*—Name of the COT property you want to modify.
- *value*—Value for the specified COT property.

Step 5 Save and activate your changes according to the instructions in the "Saving and Activating your Provisioning Changes" section on page 3-65.

Step 6 Debug the COT settings on the associated media gateway using the **show cot dsp**, **show cot request**, **show cot summary**, and **debug cot detail** commands. See the documentation for the associated media gateway for more information on these commands.

If debugging the COT settings on the media gateway does not reveal any problems, or does not fix the COT failure, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Media Gateway IP Destination or Link Out-of-Service

If an IP link or destination to a media gateway is out-of-service, perform the following steps:

Note An IP destination to a media gateway is out-of-service when both IP links associated with the destination are out-of-service.

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Ping the affected Cisco PGW 2200 Softswitch link from the associated media gateway by using the **`ping link_addr`** UNIX command.

Where:

link_addr—IP address of the affected Cisco PGW 2200 Softswitch link.

Repeat this step if the second link for the destination is also out-of-service.

If the links are unreachable, proceed to Step 10. Otherwise, proceed to Step 3.

Step 3 If the path between the Cisco PGW 2200 Softswitch and the media gateway is defined using an MGCP signaling service, proceed to Step 4. If the path between the Cisco PGW 2200 Softswitch and the media gateway is defined using a NAS signaling service, proceed to Step 5.

Step 4 Verify that the MGCP interface on your media gateway is working properly. See the documentation that is associated with the media gateway for more information.

If the MGCP interface on your media gateway is working properly, proceed to Step 10. Otherwise, correct the problems with the MGCP interface as described in the documentation that is associated with the media gateway.

Step 5 Identify which Redundant Link Manager (RLM) group is configured on the media gateway by entering the **sh run** command. For more information on this command, see the documentation that is associated with the media gateway.

Step 6 Verify that the RLM group identified in Step 5 is defined under the D-channel serial interface. See the documentation that is associated with the media gateway for more information.

If the RLM group is defined, proceed to Step 7. Otherwise, add the RLM group to the D-channel serial interface. See the documentation that is associated with the media gateway for more information.

If the link returns to service, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Reset the RLM group using the **shut**/**no shut** commands. See the documentation that is associated with the media gateway for more information.

If the links return to service, the procedure is complete. Otherwise, proceed to Step 8.

Step 8 Verify that the Cisco PGW 2200 Softswitch acknowledges RLM messages by issuing the **debug** command. See the documentation that is associated with the media gateway for more information.

If the Cisco PGW 2200 Softswitch acknowledges RLM messages, proceed to Step 10. Otherwise, proceed to Step 9.

Step 9 Verify that the configuration for RLM on the Cisco PGW 2200 Softswitch matches the configuration on the media gateway. To display the configuration of the IP links on the Cisco PGW 2200 Softswitch, enter the **prov-rtrv:iplnk:"all"** MML command at the active Cisco PGW 2200 Softswitch.

The system returns a response like the following:

```
   MGC-02 - Media Gateway Controller 2001-07-26 12:57:48
M  RTRV
   "session=active:iplnk"
   /*
NAME                  SVC                   IF                    IPADDR       PORT
PEERADDR         PEERPORT     PRI          SIGSLOT     SIGPORT     NEXTHOP          NETMASK
----                  ---                   --                    ------       ----
--------         --------     ---          ------      -------     -------          -------
va-5300-202-1         va-5300-202           enif1                   IP_Addr1     3001
172.24.200.19    3001         1            0           0           0.0.0.0     255.255.255.255
va-5300-202-2         va-5300-202           enif1                   IP_Addr1     3001
172.24.200.19    3001         1            0           0           0.0.0.0     255.255.255.255
va-5300-203-1         va-5300-203           enif1                   IP_Addr1     3001
172.24.200.20    3001         1            0           0           0.0.0.0     255.255.255.255
va-5300-203-2         va-5300-203           enif1                   IP_Addr1     3001
172.24.200.20    3001         1            0           0           0.0.0.0     255.255.255.255
   */
```

Ensure that the IP addresses (IPADDR and PEERADDR) and the ports (PORT and PEERPORT) match the values that the media gateway uses. If the values match, proceed to Step 10.

Otherwise, changes must be made on the media gateway, see the documentation for your media gateway for more information. If you need to make changes to the Cisco PGW 2200 Softswitch, start a dynamic reconfiguration session to make your changes, as described in the "Invoking Dynamic Reconfiguration" section on page 3-66.

If the changes resolve the problem, the procedure is complete. Otherwise, proceed to Step 10.

Step 10 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Calls Fail at the Cisco PGW 2200 Softswitch

If calls appear to be failing at the Cisco PGW 2200 Softswitch, and the calls are not appearing on the associated media gateway, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Debug the interface on the media gateway that is associated with the Cisco PGW 2200 Softswitch. If your system is configured for signaling, the interface is Q.931. If your system is configured for call control, the interface is MGCP. See the documentation for the associated media gateway for more information on debugging the interface.

If the calls in question do not appear on the media gateway, proceed to Step 3. Otherwise, resolve the problems with the interface as described in the documentation for the associated media gateway.

Step 3 Verify that the signaling channels are in-service, as described in the "Verifying the Status of all Signaling Services" section on page 3-9.

If any of the signaling channels are out-of-service, attempt to return them to service by using the appropriate procedures. Otherwise, proceed to Step 4.

Step 4 Run a call trace as described in the "Performing a Call Trace" section on page 6-156.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

3.1 kHz (ISDN Category 3) Calls are Failing

If 3.1-kHz calls (also known as ISDN Category 3 calls) are failing, perform the following steps:

Note The following procedure is valid only if the Cisco PGW 2200 Softswitch is using the BTNUP protocol.

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 If your system is configured for the BTNUP protocol, proceed to Step 3. Otherwise, proceed to Step 7.

Step 3 Verify the setting for the *defaultBC* property on the trunk group that is associated with the failed calls by entering the **prov-rtrv:trnkgrpprop:name="*trnkgrpname*"** MML command at the active Cisco PGW 2200 Softswitch.

Where:

trnkgrpname—MML name of the trunk group that is associated with the failed calls.

The system returns a response listing the values of all of the properties for the specified trunk group. The *defaultBC* property should be set to *3_1_KHZ* to ensure proper processing of 3.1 kHz calls. If the *defaultBC* property is set to *3_1_KHZ*, proceed to Step 7. Otherwise, proceed to Step 4.

Note Setting the *defaultBC* property changes the identifying information for incoming 3.1 kHz (ISDN Category 3) calls to match the settings for speech (ISDN category 2) calls. This change allows far-end switches to process 3.1-kHz calls, which are rejected ordinarily.

Step 4 Start a provisioning session as described in the "Starting a Provisioning Session" section on page 3-64.

Step 5 Modify the appropriate signaling service settings by issuing the **prov-ed:trnkgrpprop:name="*trnkgrpname*",defaultBC="3_1_KHZ"** command:

Where:

trnkgrpname—MML name for the affected trunk group.

Step 6 Save and activate the new configuration as described in the "Saving and Activating your Provisioning Changes" section on page 3-65.

If your system now completes 3.1-kHz calls, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Calls are Misrouting

If calls are misrouting, you might have a problem with your dial plan or routing data. To identify the source of the problem and resolve it, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Perform a diagnostic trace of the dial plan and routing data using the translation verification viewer, as described in the "Using the Translation Verification Viewer" section on page 3-134.

If the diagnostic trace does not reveal any configuration errors in your dial plan or routing data, proceed to Step 8. Otherwise, proceed to Step 3 to correct the configuration errors.

Step 3 Correct your dial plan or routing data that is indicated in the output of the translation verification viewer and proceed to Step 7.

Note Use the appropriate MML commands to correct the data based on the elements of the configuration that you must change. For more information on the appropriate MML commands for changing the configuration of individual dial plan and routing data elements, see the *Cisco PGW 2200 Softswitch Release 9.8 Dial Plan Guide*.

If the call that is misrouting is an MGCP dial call, the value for the MGCPDIALPKG result type could be incorrect. To correct the value of the MGCPDIALPKG result type, proceed to Step 4.

Step 4 Verify the current setting of the MGCPDIALPKG result type by using the **numan-rtrv:resulttable:custgrpid="*group_number*",name="*result_name*",resulttype="MGCPDIALPKG",SETNAME="*set_name*"** MML command:

Where:

- *group_number*—Customer group identification number that is associated with the affected dial plan.
- *result_name*—Result name that is associated with the affected dial plan.
- *set_name*—Name of the set that is associated with the affected MGCP dial plan.

If the setting is not correct, proceed to Step 5. Otherwise, proceed to Step 8.

Step 5 Change the MGCPDIALPKG settings by issuing the **numan-ed:resulttable:custgrpid="*group_number*",name="*result_name*",resulttype="MGCPDIALPKG",SETNAME="*set_name*" DW1="*call_type*" DW2="*x*"** MML command:

Where:

- *group_number*—Customer group identification number that is associated with the affected dial plan.
- *result_name*—Result name that is associated with the affected dial plan.
- *set_name*—Name of the set that is associated with the affected MGCP dial plan.
- *call_type*—Call type for the MGCP calls. Valid values are digital, analog, and dynamic.
- *x*—Value for data word 2. Valid values are 0 and 1.

Step 6 Deploy the updated dial plan by issuing the **chg-dpl:custgrpid="*group_number*"** MML command:

Wher:

group_number—Customer group identification number that is associated with the affected dial plan.

Step 7 Re-run the diagnostic trace on the dial plan according to way described in Step 1. If the system finds no errors, the procedure is complete. Otherwise, return to Step 3 and continue to modify your dial plan.

Note If you repeatedly modified your dial plan and routing data and errors are still appearing in the diagnostic trace, proceed to Step 8.

Step 8 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Resolving SIP Communication Problems

The Cisco PGW 2200 Softswitch software enables SIP communications. The procedures that resolve signaling channel and bearer channel problems also serve to resolve SIP communication problems. This section presents procedures for resolving SIP problems.

Stopping SIP-to-SIP Calls

Cisco PGW 2200 Softswitch software can control SIP-to-SIP calls. To stop a particular SIP-to-SIP call, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **kill-call:*sip_sig_srv*:cid="*name*",confirm** command:

Where:

- *sip_sig_srv*—MML name for the SIP signaling service that is associated with the SIP-to-SIP call.
- *name*—SIP call identification name. You can get this name by issuing the **rtrv-sip** MML command according to instructions in the "Retrieving SIP Call Information" section on page 3-62.

For example, the **kill-call:sip_svc1:cid="ccdd33ee-423fdedd-55438954-1@172.22.119.215",confirm** MML command stops a SIP-to-SIP call that runs on a SIP signaling service that is called sip_svc1:

Tracing

The following sections describe tracing on the Cisco PGW 2200 Softswitch:

- Performing a Call Trace, page 6-156
- Alternatives to Call Tracing, page 6-165
- Performing a TCAP Trace, page 6-168

Performing a Call Trace

After eliminating all physical connections, signal links, bearer channels, and destinations as the cause of a problem, the call engine running on the Cisco PGW 2200 Softswitch might be part of a problem. Performing a call trace while making a call can derive details about what takes place inside the call engine and might indicate where a breakdown is occurring.

The following sections describe call tracing:

- Starting A Call Trace, page 6-156
- Starting A Call Trace (on Release 9.7(3) Patch 8), page 6-158
- Stopping A Call Trace, page 6-161
- Retrieving Names of Open Call Trace Files, page 6-161
- Viewing the Call Trace, page 6-162
- Deleting Call Trace Files, page 6-163
- Understanding the Call Trace, page 6-163

Starting A Call Trace

To start a call trace, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the appropriate command.

You can enter this command in any one of five different formats:

- **sta-sc-trc:*sig_path*:[log=*"filenameprefix"*][,prd=*n*], confirm**
- **sta-sc-trc:*sig_path*:span=*x*[,rng=*y*][,log=*"filenameprefix"*][,prd=*n*]**
- **sta-sc-trc:*sig_path*:span=*x*[[,tc=*z*],rng=*y*][,log=*"filenameprefix"*][,prd=*n*]**
- **sta-sc-trc:*trkgrp*:[log=*"filenameprefix"*][,prd=*n*], confirm**
- **sta-sc-trc:*trkgrp*:trk=*w*[,rng=*y*][,log=*"filenameprefix"*][,prd=*n*]**

Where:

- *sig_path*—Logical signaling destination, such as an SS7 point code, an FAS path, an IP FAS path, or a DPNSS path,
- *trkgrp*—Logical trunk group that is associated with the call that you want to trace.
- *filenameprefix*—Trace files are created and written to a file that the system names differently according to how you enter the command. (The system generates a log message for each trace started. The **sta-sc-trc** command creates the filenames that are contained in the log messages.) If you specify the **log=** parameter, the value of this parameter is prefixed to the filename.

  If you do not specify the **log=** parameter, the system adds default *filenameprefix* values for each **sta-sc-trc** command, as shown in the following examples:

  – The command **sta-sc-trc:***sig_path***:confirm** generates the following filename:

  sig_path_yyyymmddhhmmss.btr

  – The command **sta-sc-trc:***trkgrp***:confirm** generates the following filename:

  trkgrp_sig_path_yyyymmddhhmmss.btr

Where:

The filename (*yyyymmddhhmmss*) is a time stamp that is formatted as follows:

- *yyyy*—Four-digit designation for the year, such as 2000, 2001, or 2002.
- *mm*—Two-digit designation for the month (01 through 12).
- *dd*—Two-digit designation for the day of the month (01 through 31).
- *hh*—Two-digit designation for the hour of the day (00 through 23).
- *mm*—Two-digit designation for the minutes of an hour (00 through 59).
- *ss*—Two-digit designation for the seconds of a minute (00 through 59).

- *n*—Duration for which call trace information is collected, in seconds. At the expiration of this period, the system discontinues PDU collection on the signaling path and closes the log file. In the absence of this parameter, the default period is set to 1800 seconds (30 minutes), after which the system stops the trace automatically.
- confirm—An option that is required to confirm a *sig_path* level trace or a *trkgrp* level trace command. This option is required because of the large volume of data that the system can generate and the potential performance impact of generating a large trace file. If you do not specify the confirm option, the system rejects the command and displays a message about the potential performance impact of this command.
- *span*—Span ID, an integer value denoting the traffic channel for the *sig_path* (NFAS only).
- *rng*—Range. When used with "**span=***x*," *y* is an optional range of spans beginning with span *x* and continuing for *y* spans. When used with "**tc=***z*," *y* is an optional range of traffic channels beginning with *z* and continuing for *y* traffic channels. When used with "**trk=***w*," *y* is an optional range of contiguous trunks that you want to trace starting with trunk *w* and ending with trunk *y*.
- *tc*—Traffic channel that is associated with the trace, in integer form.
- *trk*—Trunk that is associated with the trace, integer form.

The following paragraphs present examples of the five possible command variations:

- Signaling path level trace traces all calls occurring on the signaling path. Use this format if you do not know the specific signaling path level.

  sta-sc-trc:*sig_path*:log="*filenameprefix*", prd=600, confirm

  In this form of the command, the confirm parameter is required.

- Signaling path span-level trace traces calls at the span level. Use this format to reduce the amount of trace information if you know the span on which the call is placed.

  sta-sc-trc:*sig_path*:span=*x*

  The confirm parameter is not needed in this form of the command because the volume of the trace file should not be an issue, nor should system performance.

- Signaling path span-traffic-channel level trace traces calls at the TC or CIC level. Use this format if the traffic channel on which the call is placed is known.

  sta-sc-trc:*sig_path*:span=x,tc=y

- Trunk group level trace traces all calls at a trunk group level. Use this format if the trunk group on which the call is placed is known.

  sta-sc-trc:*trkgrp*:confirm

  This form of the command requires the confirm parameter.

- Trunk group trunk-level trace traces only calls for a given trunk (or CIC). Use this format if the trunk group and trunk on which the call is placed is known.

  sta-sc-trc:*trkgrp*:trk=*w*

Note See *Cisco PGW 2200 Softswitch Release 9 MML Command Reference* for detailed information on using the **sta-sc-trc** command.

Step 2 Make the call.

Starting A Call Trace (on Release 9.7(3) Patch 8)

You can perform advanced call traces starting from Cisco PGW 2200 Softswitch Release 9.7(3) Patch 8. The advanced call trace is based on the existing call trace function and adds the calling party number, the called party number, the MCL (Machine Congestion Level) setting, the cause value, and the call duration as call trace criteria. This enhancement makes the call trace more accurate and reduces system performance impacts on the Cisco PGW 2200 Softswitch when it is performing call traces.

To start the call trace, perform the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the command.

You can enter this command in either of the following two formats:

```
sta-sc-trc:<sig_path>:[span=x[,rng=y][,tc=z[,rng=w]]][,anubmer="calling party
number"][,bnumber="called party number"][,causevalue=c][,incompleteoverlapnumber]
[,duration=d][,mcl=m][,autostop][,prd=n][,log="log"],confirm

sta-sc-trc:<trunkgroup>:[trk=x[,rng=y]][,anubmer="calling party number"][,bnumber="called
party number"][,causevalue=c][,incompleteoverlapnumber][,duration=d]
[,mcl=m][,autostop][,prd=n][,log="log"],confirm
```

Table 6-3 provides a parameter list for this **sta-sc-trc** MML command.

Table 6-3 Parameter List of the MML Command sta-sc-trc

Parameter Name	Description	Parameter Category	Parameter Combinations
sig_path	See Starting A Call Trace, page 6-156.	Trace location	Possible combinations: • sig_path:[span=x[,rng=y][,tc=w[,rng=z]]] • trunkgroup:[trk=x[,rng=y]] **Note** If "sig_path" is present, all span/CICs at this sigpath are traced. If "sig_path" and "span" are present, all CICs at this sig_path/span are traced. If "trunkgroup" is present, all trunks in this trunk group are traced.
span	See Starting A Call Trace, page 6-156. Specify this parameter with the parameters rng and sig_path.		
rng	See Starting A Call Trace, page 6-156.		
tc	See Starting A Call Trace, page 6-156. Specify this parameter the parameters rng, span, and sig_path.		
trunkgroup	See Starting A Call Trace, page 6-156.		
trk	See Starting A Call Trace, page 6-156. Specify this parameter is used with the parameters trunk group and rng.		
rng	See Starting A Call Trace, page 6-156.		
anumber	The original calling party number up to 32 digits. Allowed digits are 0123456789abcdefABCDEF*. The wildcard "*" at the end is supported.	Call trace trigger	Optional parameters. If more than one call trace trigger parameter is present, the system collects the call trace when all conditions are met. **Note** If no trigger parameter is present, this command is used in the former way, which is described in Starting A Call Trace, page 6-156.
bnumber	The original calling party number up to 32 digits. Allowed digits are 0123456789abcdefABCDEF*. The wildcard "*" at the end is supported.		
causevalue	The internal cause value for the release message. Valid values are from 1 to 300.		
incompleteoverlapnumber	The indicator to collect incomplete-number overlap call traces. These calls are failed calls with incomplete numbers.		
duration	The call duration, in seconds. Valid values are from 3600 to 2147483. You must set this parameter value to be less than "prd" in the presence of the parameter prd. If the call duration of the call is greater than prd, the trace criterion is met and the system stops the call trace. At the same time, the system adds one new parameter CallNumberToWriteIntoTracefile in the file XECfgParm.dat to limit the number of calls (default: 200) that are included in the trace file.		

Table 6-3 Parameter List of the MML Command sta-sc-trc (continued)

Parameter Name	Description	Parameter Category	Parameter Combinations
mcl	The machine congestion level. Valid values are integers from 0 to 3. Default value is 1. Where: 0—Do not stop the call trace when MCL occurs. 1—Stop the call trace when the MCL reaches MCL1. 2—Stop the call trace when the MCL reaches MCL2. 3—Stop the call trace when the MCL reaches MCL3.	Stop condition	Optional parameters. If more than one stop condition parameter is present, the system stops the call trace when any one of these stop conditions is met.
autostop	Indicator to stop the call trace when one trace (for example, all input trace criteria are matched) is collected. This parameter is unavailable in the presence of the parameter "*duration*" or in the absence of all the other parameters.		
prd	Duration, in seconds, for which call trace information is collected. At the expiration of this period, the system discontinues PDU collection on the signaling path and closes the log file. In the absence of this parameter, the default period is set to 1800 seconds (30 minutes) after which the system stops the trace automatically.		
log	See Starting A Call Trace, page 6-156.	Other parameters	Optional parameter log. The parameter confirm is mandatory.
confirm	See Starting A Call Trace, page 6-156.		

The following paragraphs present examples of possible command variations:

- Use the following command to trace the call with the calling number 7300 and the called number 7000 at the sigpath ss7svc6:

```
sta-sc-trc:ss7svc6,anumber="7300",bnumber="7000",confirm
```

- Use the following command to trace the call with the calling number 7300 at the sigpath ss7svc6. Stop the call trace when the required call trace is collected:

```
sta-sc-trc:ss7svc6,anumber="7300",autostop,confirm
```

- Use the following command to trace the call at the sigpath ss7svc6 with CIC range from 22 to 30. Stop the call trace when the MCL reaches MCL2:

```
sta-sc-trc:ss7svc6,span=65535,tc=22,rng=8,mcl=2,confirm
```

- Use the following command to trace the call with the internal cause value 44 at the sigpath ss7svc6:

```
sta-sc-trc:ss7svc6,causevalue=44,confirm
```

- Use the following command to trace the failed call for which the overlap flag is set and the called number is incomplete at the sigpath ss7svc6:

```
sta-sc-trc:ss7svc6,bnumber="7000",incompleteoverlapnumber,confirm
```

- Use the following command to start a 12 hour call trace of the call with duration longer than 3 hours in the trunk group tg-6006:

  sta-sc-trc:tg-6006,duration=10800,prd=43200,confirm

Note You can use the following two commands to perform call traces on a standby Cisco PGW 2200 Softswitch.
sta-sc-trc:<*sig_path*>:[span=x[,rng=y][,tc=z[,rng=w]]][,mcl=m][,prd=n][,log="log"],confirm
sta-sc-trc:<*trunkgroup*>:[trk=x[,rng=y]][,mcl=m][,prd=n][,log="log"],confirm

Step 2 Make the call.

Stopping A Call Trace

You can stop a call trace session by issuing the **stp-sc-trc** MML command. To stop a call trace session on a particular signaling service, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-sc-trc:*sig_srv*|*trkgrp*** command.

Where:

- *sig_srv*—MML name for the signaling service on which you are running a call trace.
- *trkgrp*—MML name for the trunk group on which you are running a call trace.

For example, to stop a call trace session on a trunk group that is called T-1-1, enter the **stp-sc-trc:T-1-1** command.

To stop all call trace sessions, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-sc-trc:all** command.

The system returns a response like the following:

```
Media Gateway Controller 2000-03-21 15:28:03
M  COMPLD
   "ALL:Trace stopped for the following files:
   ../var/trace/_dpc1_20000321152752.btr
   "
```

Retrieving Names of Open Call Trace Files

To retrieve the names of call trace files for sessions that are in progress, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **rtrv-sc-trc** command.

The system returns a response like the following:

```
Media Gateway Controller 2000-03-21 15:28:03
M  RTRV
   "RTRV-SC-TRC:Trace in progress for the following files:
   ../var/trace/_dpc1_19991221131108.btr
   ../var/trace/sigtest_dpc2_19991221131109.btr
  "
```

Starting with Cisco PGW 2200 Softswitch Release 9.7(3) Patch 8, you can use the **rtrv-sc-trc::stopreason** command to retrieve the stop reason of the last trace file.

The call trace stops for one of the following four reasons.

- Call trace is stopped because the MCL is reached.

```
   MGC-02 - Media Gateway Controller 2008-04-28 10:25:36.782 EDT
M  RTRV
   "../var/trace/eisup-0428_eisup-pgw2_20080427223536.btr: MCL reached.
"
   ;
```

- Call trace is stopped automatically and the desired call trace is collected.

```
   MGC-02 - Media Gateway Controller 2008-04-30 14:39:19.042 CST
M RTRV
   "../var/trace/_ss7svc1_20080430143908.btr: automatically stopped.
"
   ;
```

- Call trace is stopped manually.

```
   MGC-02 - Media Gateway Controller 2008-04-30 14:39:59.849 CST
M RTRV
   "../var/trace/_ss7svc1_20080430143951.btr: manually stopped.
"
   ;
```

- Call trace is stopped because the trace period is over.

```
   MGC-02 - Media Gateway Controller 2008-04-30 14:43:59.982 CST
M RTRV
   "../var/trace/_ss7svc1_20080430144354.btr: trace period expired.
"
   ;
```

Viewing the Call Trace

The MML command **sta-sc-trc** produces binary trace (.btr) files, which you cannot view with a text editor. The main part of the filename is set up in the **sta-sc-trc** command, as explained in the "Starting A Call Trace" section on page 6-156, and the Cisco PGW 2200 Softswitch adds the extension .btr to these files. The .btr files can contain tracings from many calls all mixed together. Each tracing record in the file has a specific record type and records information of the type that relates to that record. Each record has a unique call ID that associates it with a specific call and is a recording of the external events to which the MDL call model was exposed while the recording was made. Each tracing record is not a recording of the actual MDL.

Use the trace viewer to view and navigate through call trace outputs. For more information on using the trace viewer, see the "Using the Trace Viewer" section on page 3-134.

Also view the call trace output data using the **get_trc.sh** UNIX script. **Get_trc.sh** uses the Conversion Analyzer and SimPrint utilities in combination to give a single common interface to all the trace tools. **Get_trc.sh** uses the UNIX **less** utility for displaying file output (it is assumed that **less** is available on the system). For more information on the **less** utility, enter the **man less** UNIX command.

You can start the script by entering the **`get_trc.sh`** ***`filename`*** UNIX command.

Where:

filename—Name of the call trace output data file (.btr) that you want to view.

The script then displays a list of commands and prompts you to enter a command. The script lists the following commands:

- S—Displays the call trace data using the SimPrint utility. For more information on SimPrint, see the "Understanding SimPrint" section on page 6-165.
- F—Displays the call trace data using the SimPrint utility, and a listing of the sent and received fields.
- D—Displays the data in the .trc file associated with this call trace. For more information on .trc files, see the "Understanding Trace Files" section on page 6-164.
- C—Converts the file that this script creates to a .trc file.
- A—Displays the data in the .ca file associated with this call trace. For more information on .ca files, see the "Understanding the Conversion Analyzer" section on page 6-164.
- N—Displays the information for the next call ID in the list.
- P—Displays the information for the previous call ID in the list.
- L—Lists all the call IDs in the data for this call trace.
- H—Provides help on displaying call trace data.
- Q—Closes the script.
- id—Displays the information for a call ID that you specify.

Deleting Call Trace Files

Call trace files can be rather large. Leaving these files on your disk after you no longer require them could raise capacity issues. Delete call trace files by issuing UNIX commands, as described in the "Deleting Unnecessary Files to Increase Available Disk Space" section on page 6-169.

Understanding the Call Trace

Call traces record information in a trace file that shows how the Cisco PGW 2200 Softswitch processed a specific call. Traces are most useful when you can be sure that a problem call is reaching the call engine and starting an instance of a Message Definition Language (MDL) state machine. You can determine whether the problem call is reaching the call engine by looking for the presence of non-idle circuits (**rtrv-cic**) or "new cmgCall" entries in the debug logs.

After you start a trace, all call-processing activity for calls originating from the specified destination is captured. The trace enables you to follow the call through the Cisco PGW 2200 Softswitch to discover where it fails.

The trace output is in binary format. It shows:

- PDU that the Cisco PGW 2200 Softswitch receives
- How the Cisco PGW 2200 Softswitch decodes the PDU
- PDU that the Cisco PGW 2200 Softswitch sends

Using call trace logs is uncomplicated if you remember how to locate the record of a call:

- You can locate incoming signal messages that start instances of engine call objects by searching backwards in the call trace for "new cmgCall."
- Similarly, you can find the end of a call by searching forward from the "new cmgCall" message for the next "end cmgCall" message.

If you are experiencing problems with call processing and need to contact Cisco for support, you should run a call trace before contacting Cisco TAC. The trace file helps the Cisco TAC troubleshoot the problem more effectively. For some problems, the Cisco TAC cannot begin troubleshooting the problem until you supply the trace file; so, it is a good practice to create this file before contacting them.

Understanding the Conversion Analyzer

The Conversion Analyzer is a viewer utility for .btr trace files. The Conversion Analyzer displays each record from a .btr file in a readable form (ASCII text) that you can view with any text editor; however, some useful sorting and display options are also available.

The .btr files serve as source files for .ca files. The .ca files are ASCII text output from the Conversion Analyzer, which is obtained because of redirection of the standard output to a file. There are two main sections in a .ca file. The header section contains a list of every signaling path that is defined on the Cisco PGW 2200 Softswitch and a list of the message definition object (MDO) modules that are loaded. The main body contains a printout of every record. Each record has a record number, a timestamp, a call ID, and the print data that the record contains.

Understanding the Simulator Utility

The Simulator is a powerful MDO file processing utility that uses .mdo files to replay the events recorded in a .btr file. The front end of the Simulator reads the .btr file. The interpreter in the Simulator utility that loads the .mdo files and replays the events (.btr files) through the MDO, is the same interpreter that the call engine uses in the Cisco PGW 2200 Softswitch when .mdo files are used. As the interpreter steps through each line of object code (and the action of each object is interpreted) in the .mdo file, the utility activates the print method of each object, which forms the next line of text in the .trc file.

The print method for each object contains text that directly relates to the appearance of the .mdl source code that produced the object in the .mdo file (through compilation of the .mdl source code with the MDL compiler). The .mdo files that are used with the Simulator when it is processing a .btr file to create a .trc file, must be the same .mdo files that were in use when the .btr file was originally recorded on the Cisco PGW 2200 Softswitch. This requirement defines why the conversion from a .btr file to a .trc file is usually done on the Cisco PGW 2200 Softswitch that originated the .btr file.

The interpreter is not used with .so files because those files interact directly with the call engine in the Cisco PGW 2200 Softswitch; but, the tracer can record a .btr file regardless of whether .mdo or .so files were used to process the call. The Simulator can, however, replay .btr files by using .so files in place of .mdo files. This capability of the Simulator provides a way of ensuring that the .so and .mdo files perform the same way (although .so is faster).

Because .so files do not contain MDO objects, there are no print methods available to the Simulator, so no .trc output is possible. When the Cisco PGW 2200 Softswitch produces a .btr file by using .so files, the replay in the Simulator must be done with the .mdo files that were used to produce the .so files to produce an accurate .trc file.

Understanding Trace Files

The Simulator utility produces trace files (.trc files), which are text files. Trace files contain detailed line-by-line trace information from the MDO code that was run in the simulation replay that produced the file, thus they contain MDL traces. The **get_trc.sh** script adds the .trc extension if the source of the trace is a .btr file.

Trace files are source files for the SimPrint (SP) utility. Trace files are text files and can be viewed with a text editor. You should send the .trc file to Cisco TAC if expert analysis is required.

Understanding SimPrint

SimPrint (SP) is a utility for viewing .trc files. SP converts a .trc file into a sequence diagram that shows all of the external and internal events that occur in a .trc file. The sequence diagram is useful for getting an overview of what is occurring in the trace.

The following list defines the terms that are used in the call flow printouts, which the SimPrint tool generates:

- LINE—Incoming and outgoing interfaces of the Cisco PGW 2200 Softswitch.
- OCC—Originating Call Control state machine. The call is passed from the incoming interface to a protocol adapter, where it is converted into a generic message signaling unit (MSU) and sent to the OCC for parsing of MSU data to memory.
- LCM—Lightspeed Call Model state machine. The LCM is a generic call model, which contains event handlers to process generic call event data. This processing includes generic call analysis, requests for bearer channels, and transfer of the MSU to the appropriate TCC state machine. The LCM is also known as the Universal Call Model (UCM).
- ANALYSIS—LCM can perform generic call analysis that is based on the content of the MSU. The LCM exchanges data with the call processing engine to analyze the MSU. After analysis is complete, an available circuit is identified and the LCM sends a bearer channel seizure request message to the CPM state machine.
- CPM—Connection Plane Manager state machine. The CPM exchanges data with the call processing engine to seize and prepare a bearer channel for routing of the call data.
- CDR—Call Detail Record. CDR information is created because of LCM processing of the MSU.
- TRIGGER—Intelligent Network (IN) Trigger state machine. This state machine to sends and receives IN trigger events to the Transfer Capabilities Application Part (TCAP) interface in the I/O channel controller (IOCC). This ability to send and receive IN trigger events enables the tool to send IN messages to a service control point (SCP).
- ENGINE—Call processing engine exchanges data with the LCM as generic call analysis is performed on the MSU and a bearer channel is seized and prepared for routing of the call data.
- TCC—Terminating Call Control state machine. The TCC changes the call data into a protocol-specific protocol data unit (PDU) and passes the PDU to the terminating IOCC for routing to the outgoing interface.

Alternatives to Call Tracing

Performing call traces to identify problems can be difficult. A trace can gather much data before the error occurs. Traces can negatively affect system performance. The Cisco PGW 2200 Softswitch software has MML commands that you can use to diagnose problems with hung calls and abnormal call termination. The following sections describe the commands.

Diagnosing Hung Calls

You can print the diagnostic information about hung calls to a file by issuing the **prt-call** MML command. The contents of the file include all the previous states of the call and a history of occurrences leading up to the call being stuck in its current state.

To print diagnostic information on a hung call, complete the following steps:

Step 1 If the hung call is a SIP-to-SIP call, proceed to Step 3. Otherwise, proceed to Step 2.

Step 2 Log in to the active Cisco PGW 2200 Softswitch and enter the **prt-call:*sig_path*:cic=*number* [,log="*xyz*"]** command

or

prt-call:*sig_path*:span=*phys*, bc=*bchan* [,log="*xyz*"]

Where:

- *sig_path*—Corresponding MML name for any of the following component types:
  - Signaling path of in-band TDM up to MUX and then time switched to TDM media and sent to the Cisco PGW 2200 Softswitch.
  - Signaling path of in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - Signaling path of in-band TDM signaling up to NAS and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->NAS<-NI2/IP->Cisco PGW 2200 Softswitch).
  - Signaling path or routeset that is associated with an SS7 destination point code.
  - Signaling path for EISUP.

Note This command allows use of wildcards for the *sig_path* parameter.

- *number*—Numeric value that identifies the ISUP circuit identification code (CIC) number.
- *phys*—16-bit value that identifies an ISDN/PRI physical cable.
- *bchan*—Numeric value that identifies the non-ISUP bearer channel number. BC is used for non-ISUP trunks. Otherwise, use CIC.
- *xyz*—Optional parameter that names the ASCII log file to which the output of this command is written. The name that is specified for this parameter is prefixed to the actual name of the file, which includes the *sig_path* name, date, and time. If you do not provide a log filename, a default name consisting of the *sig_path* name, date, and time is created. The extension of these log files is .prt. The files are located in the $BASEDIR/var/trace directory.

For example, the **prt-call:dms100-pc:cic=124** MML command prints call data for a signaling service that is called dms100-pc using a CIC of 124.

Proceed to Step 4.

Step 3 Log in to the active Cisco PGW 2200 Softswitch and enter the **prt-call:*sig_path*:cid="*name*" [,log="*xyz*"]** command.

Where:

- *sig_path*—MML name for the signaling service that is associated with the SIP-to-SIP call.
- *name*—SIP call identification name. You can obtain this name by issuing the **rtrv-sip** MML command, as described in the "Retrieving SIP Call Information" section on page 3-62.

- *xyz*—Optional parameter that names the ASCII log file to which the output of this command is written. The name that you specify for this parameter is prefixed to the actual name of the file, which includes the *sig_path* name, date, and time. If you do not provide a log filename, a default name consisting of the *sig_path* name, date, and time is created. The extension of these log files is .prt. The files are located in the $BASEDIR/var/trace directory.

For example, the **prt-call:sip_svc1:cid="ccdd33ee-423fdedd-55438954-1@172.22.119.215"** MML command prints call data for a particular call on a SIP signaling service that is called sip_svc1.

Step 4 Change directories to access the log file by entering the **cd /opt/CiscoMGC/var/trace** command.

Step 5 Use a text file viewer, such as vi, to view the contents of the log file.

Performing an Abnormal Call Termination Trace

You can print the global variable information from the state machine, and external event information for a call, to a file by issuing the **sta-abn-trc** MML command. To print this information, complete the following steps:

Step 1 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **sta-abn-trc:*sig_path*|all[,log=*xyz*] [,prd=*n*],confirm** command:

Where:

- *sig_path*—Corresponding MML name for any of the following component types:
  - Signaling path of in-band TDM up to MUX and then time switched to TDM media and sent to Cisco PGW 2200 Softswitch.
  - Signaling path of in-band TDM signaling up to CU and then encapsulated and sent over IP to the Cisco PGW 2200 Softswitch.
  - Signaling path of in-band TDM signaling up to NAS and then converted to NI2 and sent to the Cisco PGW 2200 Softswitch over IP (that is, FE box<-sig/tdm->NAS<-NI2/IP->Cisco PGW 2200 Softswitch).
  - Signaling path or routeset that is associated with SS7 DPC.
  - Signaling path for EISUP.

Note This command allows wildcards for the *sig_path* parameter.

- **all**—Indicates that the start trace command applies to the whole Cisco PGW 2200 Softswitch, in which case only one trace file is generated.
- *xyz*—Name of an ASCII log file to which the output of this command is written. The name that you specify for this parameter prefixes the actual name of the file, which includes the *sig_path* name, date, and time. If you do not specify a log filename, the command creates a default name consisting of the *sig_path* name, date. The extension of these log files is .prt. The files are located in the $BASEDIR/var/trace directory.
- *n*—Period, in seconds, for which this trace is enabled, during which time any abnormal calls are traced. If you do not specify this optional parameter, the period defaults to 30 seconds.

For example, the **sta-abn-trc:dms100-pc,log=trace1,confirm** MML command prints call data for a signaling path that is called dms100-pc to a file named trace1 (because the period parameter, *n*, is not specified, the trace lasts for the default period, 30 seconds).

Step 2 To change directories, enter the **cd /opt/CiscoMGC/var/trace** UNIX command.

Step 3 Use a text file viewer, such as vi, to view the contents of the log file.

Stopping an Abnormal Call Termination Trace

You can stop an in-progress abnormal call termination trace by issuing the **stp-abn-trc** MML command. To stop the trace in progress, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-abn-trc:*sig_srv*** command.

Where:

sig_srv is the MML name for a signaling service on which the abnormal call termination trace is run.

For example, to stop an abnormal call termination trace that is run on a signaling service, which is called ss7srv1, enter the **stp-abn-trc:ss7srv1** command.

The system responds with a response like the following:

```
Media Gateway Controller 2000-05-26 07:02:11
M  COMPLD
"Trace stopped for the following file:

../var/trace/_20000526070211.abn
"
```

To stop all in-progress abnormal call termination traces, log in to the active Cisco PGW 2200 Softswitch, start an MML session, and enter the **stp-abn-trc:all** command.

The system returns a response like the following:

```
Media Gateway Controller 2000-05-26 07:02:11
M  COMPLD
   "ALL:Trace stopped for the following files:

   ../var/trace/_20000526070211.abn
   "
```

Performing a TCAP Trace

To run a TCAP trace on your system, perform the following steps:

Step 1 Start the TCAP trace by logging in to the active Cisco PGW 2200 Softswitch, starting an MML session, and entering the **sta-tcap-trc** command.

The system begins sending TCAP trace messages to the active system logs file.

Step 2 View the active system logs file according to instructions in the "Viewing System Logs" section on page 6-90. Note any TCAP trace messages, such as hex dumps of messages that are sent to the SCCP layer.

Step 3 When the TCAP trace is complete, enter the **stp-tcap-trc** command to stop the TCAP trace.

Platform Troubleshooting

The following sections contain procedures that pertain to resolving problems with the Cisco PGW 2200 Softswitch platform:

- Verifying Cisco PGW 2200 Softswitch Ethernet Operation, page 6-169
- Deleting Unnecessary Files to Increase Available Disk Space, page 6-169
- Recovering from a Switchover Failure, page 6-170
- Recovering from Cisco PGW 2200 Softswitch Failure, page 6-172
- Restoring Stored Configuration Data, page 6-177
- Restoring a Backup File from a Device, page 6-178
- Configuration Export Failed Because of MMDB, page 6-180
- Measurements Are Not Being Generated, page 6-180
- Call Detail Records Are Not Being Generated, page 6-181
- Resolving a Failed Connection to a Peer, page 6-181
- Rebooting Software to Modify Configuration Parameters, page 6-183
- Diagnosing SNMP Failure, page 6-184
- Correcting the System Time, page 6-185
- Securing Your Network, page 6-187
- TIBCO Interface Not Working, page 6-195
- Installing the License File, page 6-197
- Replacing a Failed Disk, page 6-197

Verifying Cisco PGW 2200 Softswitch Ethernet Operation

See the documentation that Sun Microsystems provides for more information on verifying the proper functioning of the Ethernet connections on the Cisco PGW 2200 Softswitch.

Deleting Unnecessary Files to Increase Available Disk Space

You might need to delete call trace files, archived log files, or configurations from your system to increase available disk space on the Cisco PGW 2200 Softswitch. The following procedure presents the process for deleting all three file types.

Step 1 Log in to the active Cisco PGW 2200 Softswitch and enter the **`cd /opt/CiscoMGC/var/trace`** and **ls** UNIX commands to determine whether the affected disk drive contains any call trace files in the /opt/CiscoMGC/var/trace directory.

The system responds with a list of files in the directory. If the command response indicates that there are *.btr and *.trc files in this directory, proceed to Step 2. Otherwise, proceed to Step 4.

Note Do not delete any call trace files that are related to troubleshooting any current system problems.

Step 2 Delete the identified call trace files using the **rm -i *filename*** UNIX command.

Where:

filename—Name of the call trace file (either *.btr or *.trc) that you identified for deletion.

Step 3 Repeat Step 2 for each additional call trace file that is identified for deletion.

Step 4 Enter the **cd /opt/CiscoMGC/var/spool** and **ls** UNIX commands to view the archived logs in the /opt/CiscoMGC/var/spool directory on the affected disk drive:

The system responds with a list of files in the directory. Review the listed files. If archived log files are listed, which are no longer required, proceed to Step 5. Otherwise, proceed to Step 7.

Note If you back up the system software regularly, you can retrieve files that to delete from your backup files. For more information on backing up your system software, see the "Backing Up System Software" section on page 3-29.

Step 5 Delete the identified archived log files using the **rm -i *filename*** UNIX command.

Where:

filename—Name of the archived log file you want to delete.

Step 6 Repeat Step 5 for each additional identified archived log file.

Step 7 Use the config-lib viewer to view the contents of the configuration library, according to instructions the "Using the Config-Lib Viewer" section on page 3-127. Determine whether any of the configurations that are listed are no longer necessary for the operation of the system. If you can delete any of the configurations, delete them by using the procedure in the "Using the Config-Lib Viewer" section on page 3-127.

Recovering from a Switchover Failure

Use the procedure in this section to recover from a failed switchover operation. Typically, you would use this procedure when the standby Cisco PGW 2200 Softswitch is unavailable to process calls and a critical alarm occurs on the active Cisco PGW 2200 Softswitch.

To recover from a switchover failure, complete the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch, start an MML session, and view the current alarms, as described in the "Retrieving All Active Alarms" section on page 6-3.

Step 3 To identify the critical alarm that caused the switchover attempt, review the alarms that are listed in the response. There should be at least one critical alarm and an alarm indicating that a switchover began and another alarm indicating that the switchover failed.

If only one critical alarm is listed, that alarm caused the switchover attempt.

If more than one critical alarm is listed, compare the timestamp of the critical alarms with the timestamp of the alarm indicating that a switchover began. The critical alarm that occurred before the switchover was begun is the alarm that caused the switchover attempt.

Step 4 See the "Alarm Troubleshooting Procedures" section on page 6-4 for descriptions of the steps necessary to resolve the critical alarm that caused the switchover attempt.

Step 5 Log in to the standby Cisco PGW 2200 Softswitch, start an MML session, and view the current alarms, as described in the "Retrieving All Active Alarms" section on page 6-3.

Step 6 Resolve the listed alarms. See the "Alarm Troubleshooting Procedures" section on page 6-4 for the steps that are required to resolve the alarms.

If resolving the alarms does not stabilize the standby Cisco PGW 2200 Softswitch, proceed to Step 7.

Step 7 Transmit a ping from the active Cisco PGW 2200 Softswitch to the standby Cisco PGW 2200 Softswitch by issuing the **ping *standby_addr*** UNIX command at the active Cisco PGW 2200 Softswitch:

Where:

standby_addr—IP address of the standby Cisco PGW 2200 Softswitch.

If the ping fails, proceed to Step 8. Otherwise, proceed to Step 9.

Step 8 Verify the Ethernet interfaces between the active Cisco PGW 2200 Softswitch and the standby Cisco PGW 2200 Softswitch. See the Sun Microsystems documentation that came with your system for more information.

If an element of the Ethernet interfaces between the active Cisco PGW 2200 Softswitch and the standby Cisco PGW 2200 Softswitch is faulty, replace it. Otherwise, proceed to Step 9. See the Sun Microsystems documentation that came with your system for more information.

If replacing a faulty element resolves the problem, the procedure is complete. Otherwise, proceed to Step 9.

Step 9 Verify that the hostname for each Cisco PGW 2200 Softswitch is unique. To verify the hostnames, log on as root to each Cisco PGW 2200 Softswitch and view the contents of the host file in the /etc directory. If a Cisco PGW 2200 Softswitch does not have a unique hostname, enter the **echo *host_name* > /etc/host** UNIX command.

Where:

host_name—Unique name for the Cisco PGW 2200 Softswitch.

Step 10 Verify that the IP address parameters in the XECfgParm.dat file, which are presented in the following list, are set correctly on each host.

- *.ipAddrLocalA
- *.ipAddrLocalB
- *.ipAddrPeerB
- *.IP_Addr1
- *.IP_Addr2
- *.IP_Addr3
- *.IP_Addr4
- *.Virtual_IP_Addr

If the IP address settings are correct, proceed to Step 11. Otherwise, update the IP address parameters for each host by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If updating the IP address parameters resolves the problem, the procedure is complete. Otherwise, proceed to Step 11.

Step 11 Verify that the settings for the foverd parameters, which are presented in the following list, are set correctly in the XECfgParm.dat file on each host.

```
foverd.conn1Type         = socket
foverd.ipLocalPortA      = 1051
foverd.ipPeerPortA       = 1052
foverd.conn2Type         = socket
foverd.ipLocalPortB      = 1053
foverd.ipPeerPortB       = 1054
foverd.conn3Type         = serial
foverd.conn3Addr         = /dev/null
foverd.abswitchPort      = (/dev/null)
foverd.heartbeatInterval = 1000
```

If the foverd settings are correct, proceed to Step 12. Otherwise, update the foverd settings in the XECfgParm.dat files using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

If updating the foverd settings resolves the problem, the procedure is complete. Otherwise, proceed to Step 12.

Step 12 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Recovering from Cisco PGW 2200 Softswitch Failure

Some situations, such as a replacement of a failed disk drive, natural or man-made disaster, or software corruption, require you to recover the software configuration data for a failed Cisco PGW 2200 Softswitch (for example, if the Cisco PGW 2200 Softswitch software is corrupted or you have replaced a failed disk drive).

Note In these procedures, it is assumed that backup operations have been performed regularly on the Cisco PGW 2200 Softswitch. For more information on backing up the Cisco PGW 2200 Softswitch, see the "Backing Up System Software" section on page 3-29.

Note Successful recovery from a natural or man-made disaster depends upon advanced planning for a possible disaster. See the "Creating a Disaster Recovery Plan" section on page 3-28 for more information.

The following sections contain the procedures that describe how to recover from Cisco PGW 2200 Softswitch failure:

- Recovering from a Cisco PGW 2200 Softswitch Failure in a Simplex System, page 6-173
- Recovering from a Single Cisco PGW 2200 Softswitch Failure in a Continuous Service System, page 6-175
- Recovering from a Dual Cisco PGW 2200 Softswitch Failure in a Continuous Service System, page 6-176

Recovering from a Cisco PGW 2200 Softswitch Failure in a Simplex System

To recover from a Cisco PGW 2200 Softswitch failure in a system that is equipped with only one Cisco PGW 2200 Softswitch, perform the following steps:

Step 1 Reload the Solaris 10 operating system on the Cisco PGW 2200 Softswitch, as described in the *Installing the Sun Solaris 10 Operating System* chapter of *Cisco PGW 2200 Softswitch Release 9 Software Installation and Configuration Guide*.

Step 2 Reload the Cisco PGW 2200 Softswitch software on the Cisco PGW 2200 Softswitch, as described in the *Installing the Cisco PGW 2200 Softswitch Software* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 3 Restore the configuration of the Cisco PGW 2200 Softswitch from the latest backup file, as described in the "Restoring Stored Configuration Data" section on page 6-177.

Note If backup files are stored on a remote server, a network administrator must re-establish the path between the Cisco PGW 2200 Softswitch and the server that stores the backups.

Note Any changes that you made to the Cisco PGW 2200 Softswitch system subsequent to your last backup are lost.

Step 4 Start the Cisco PGW 2200 Softswitch software, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Recovering from a DiskSuite Failure on the Opteron Platform

To recover from a DiskSuite failure on the Opteron platform, perform the following steps:

Step 1 Shut down the Cisco PGW 2200 Softswitch. See "Cisco PGW 2200 Softswitch Shutdown Procedure" section on page 2-4.

Step 2 Remove the damaged disk, for example, Disk 1.

Step 3 Boot up the system from Disk 2.
The system enters the maintenance mode automatically.

Step 4 Enter the **`metadb -d c0t2d0s4`** command and press **Enter** to delete state database replicas of the damaged disk.

Note In the preceding command example, the last parameter is the device ID of the damaged disk. In this example, the device ID for the damaged disk is c0t2d0s4. You can use the **metadb** command to get the device ID of the damaged disk, which is marked as unknown.

Step 5 Plug in a new disk to replace the damaged Disk 1 in the slot for Disk 1.

Step 6 Enter the **`reboot -- -r`** command and press **Enter**.

Note Change the boot sequence in the bios settings. Ensure that the system boots from Disk 2 rather than the newly inserted disk. The system enters the maintenance mode automatically.

Step 7 Enter the **`format`** command in the console and press **Enter**.

Step 8 Enter **1** to select Disk 2.

Step 9 Enter the **`partition`** command in the console and press **Enter** to enter the partition menu.

Step 10 Enter the **`name`** command to name the current partition table.

Step 11 Enter **cisco** for the current partition table name.

Step 12 Enter the **`quit`** command and press **Enter**.

Step 13 Enter the **`save`** command and press **Enter**.
The new disk partition definitions are saved to the default file ./format.dat.

Step 14 Enter the **`quit`** command and press **Enter**.

Step 15 Enter the **`format -x ./format.dat`** command and press **Enter**.

Step 16 Enter **0** to select the newly inserted disk.

Step 17 Enter the **`partition`** command and press **Enter**.

Step 18 Enter the **`select`** command and press **Enter.**

Step 19 Enter **0** to specify the table number.

Step 20 Enter the **`print`** command and press **Enter**.
A list of the current partition table is listed.

Step 21 Enter the **`label`** command and press **Enter** to label the disk.

Step 22 Enter **y** to confirm the labeling**.**

Step 23 Enter **quit** and press **Enter** to quit the partition operation.

Step 24 Enter **quit** and press **Enter** to quit the format operation.

Step 25 Enter the **metadb -a -c 3 c0t2d0s4** command and press **Enter**.

Note See Step 4 for the meaning of the last parameter.

Step 26 Enter the **metastat | grep metareplace** command and press **Enter** to discover the failed submirrors.

A list like the following is displayed.

```
Invoke: metareplace d12 c0t2d0s5 <new device>
Invoke: metareplace d9 c0t2d0s3 <new device>
Invoke: metareplace d6 c0t2d0s1 <new device>
Invoke: metareplace d3 c0t2d0s0 <new device>
Invoke: metareplace d15 c0t2d0s6 <new device>
```

Step 27 Enter the following commands to enable the failed submirrors according to the list generated in Step 26.

```
metareplace -e d12 c0t2d0s5
metareplace -e d9 c0t2d0s3
metareplace -e d6 c0t2d0s1
metareplace -e d3 c0t2d0s0
metareplace -e d15 c0t2d0s6
```

Step 28 Enter the **metastat | grep "Resync in progress"** command to check data mirroring progress.

Text like the following is displayed.

```
Resync in progress: 1% done
Resync in progress: 16% done
Resync in progress: 30% done
Resync in progress: 39% done
Resync in progress: 98% done
```

Recovering from a Single Cisco PGW 2200 Softswitch Failure in a Continuous Service System

To recover from a single Cisco PGW 2200 Softswitch failure in a system that is equipped with two Cisco PGW 2200 Softswitches, perform the following steps:

Step 1 Reload the Solaris 10 operating system on the affected Cisco PGW 2200 Softswitch, as described in the *Installing the Sun Solaris 10 Operating System* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 2 Reload the Cisco PGW 2200 Softswitch software on the affected Cisco PGW 2200 Softswitch, as described in the *Installing the Cisco PGW 2200 Softswitch Software* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 3 Restore the configuration of the affected Cisco PGW 2200 Softswitch from your latest backup file, as described in the "Restoring Stored Configuration Data" section on page 6-177.

Note If backup files are stored on a remote server, a network administrator must re-establish the path between the affected Cisco PGW 2200 Softswitch and the server that stores your backups.

Step 4 Open the XECfgParm.dat file on the affected Cisco PGW 2200 Softswitch in a text editor, such as vi.

Step 5 Search for the pom.dataSync property and ensure that it is set to *true*.

Step 6 Save the file and exit the text editor.

Step 7 Start the Cisco PGW 2200 Softswitch software, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 8 Synchronize the databases of the active and standby Cisco PGW 2200 Softswitches by using the procedure that is described in the *Synchronizing Databases* section of the *Configuring the Cisco PGW 2200 Softswitch Software Release 9.8* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Recovering from a Dual Cisco PGW 2200 Softswitch Failure in a Continuous Service System

To recover from a dual Cisco PGW 2200 Softswitch failure in a system that is equipped with two Cisco PGW 2200 Softswitches, perform the following steps:

Step 1 Select one of the Cisco PGW 2200 Softswitches to be your active system, and the other to be your standby system.

Step 2 Reload the Solaris 10 operating system on the active Cisco PGW 2200 Softswitch, as described in the *Installing the Sun Solaris 10 Operating System* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 3 Reload the Cisco PGW 2200 Softswitch software on the active Cisco PGW 2200 Softswitch, as described in the *Installing the Cisco PGW 2200 Softswitch Software* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 4 Restore the configuration of the active Cisco PGW 2200 Softswitch from your latest backup file, as described in the "Restoring Stored Configuration Data" section on page 6-177.

Note If the backup files are stored on a remote server, a network administrator must re-establish the path between the active Cisco PGW 2200 Softswitch and the server that stores your backups.

Step 5 Open the XECfgParm.dat file on the active Cisco PGW 2200 Softswitch in a text editor, such as vi.

Step 6 Search for the pom.dataSync property and ensure that it is set to *true*.

Step 7 Save the file and exit the text editor.

Step 8 Start the Cisco PGW 2200 Softswitch software on the active Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 9 Reload the Solaris 10 operating system on the standby Cisco PGW 2200 Softswitch, as described in the *Installing the Sun Solaris 10 Operating System* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 10 Reload the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the *Installing the Cisco Cisco PGW 2200 Softswitch Software* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Step 11 Restore the configuration of the standby Cisco PGW 2200 Softswitch from your latest backup file, as described in the "Restoring Stored Configuration Data" section on page 6-177.

Note If the backup files are stored on a remote server, a network administrator must re-establish the path between the standby Cisco PGW 2200 Softswitch and the server that stores your backups.

Step 12 Open the XECfgParm.dat file on the standby Cisco PGW 2200 Softswitch in a text editor, such as vi.

Step 13 Search for the pom.dataSync property and ensure that it is set to *true*.

Step 14 Save the file and exit the text editor.

Step 15 Start the Cisco PGW 2200 Softswitch software, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 16 Synchronize the databases of the active and standby Cisco PGW 2200 Softswitches by using the procedure that is described in the *Synchronizing Databases* section of the *Configuring the Cisco PGW 2200 Softswitch Software Release 9* chapter of *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

Restoring Stored Configuration Data

Typically, you need to restore configuration data in response to a critical case when the Cisco PGW 2200 Softswitch is not functioning properly, because of hardware failure, natural disaster, or software corruption. The procedures in this section describe how to restore the Cisco PGW 2200 Softswitch configuration data that is stored either on a tape drive or on a remote network server.

There are two restoration methods available for the Cisco PGW 2200 Softswitch software, one for software releases up to 9.1(4), and another for software releases from 9.1(5) and more recent software releases. These restoration procedures are mutually exclusive. You cannot use the restoration procedures for one software release to restore files that were backed up using the procedures specific to the other release.

These restoration methods are described in the following section:

- Restoring Procedures for Cisco PGW 2200 Softswitch Software, page 6-177

Restoring Procedures for Cisco PGW 2200 Softswitch Software

This restoration method uses a script to restore the configuration data for the Cisco PGW 2200 Softswitch software, select UNIX administrative files, and the Main Memory Database (MMDB).

Note If you want to use this functionality, you must upgrade the software to the proper patch level. For more information on verifying the patch level of your system, see the "Verifying the Patch Level of the Cisco PGW 2200 Softswitch" section on page 3-100.

The following sections provide the restoration procedures:

- Listing Backup Files, page 6-178
- Restoring a Backup File from a Directory, page 6-178
- Restoring a Backup File from a Device, page 6-178

Note These procedures assume that you back up your system configuration data regularly. For the procedures for system configuration backup, see the "Backup Procedures for Cisco PGW 2200 Softswitch Software" section on page 3-30.

Listing Backup Files

To list the backup files in a particular directory path, enter the **mgcrestore -d *path* -l** UNIX command on the Cisco PGW 2200 Softswitch.

Where:

path—Directory path in which you stored backup files, such as a directory on a remote server or a local tape drive.

The system returns a response like the following:

```
Backup files in /var/cisco
-------------------------------------------------
mgc_venus_20011010_153003_backup
mgc_venus_20011011_153003_backup
mgc_venus_20011012_153003_backup
```

Restoring a Backup File from a Directory

To restore the configuration data that is stored in a particular backup file that is stored in a directory, enter the **mgcrestore -d *path* -f *filename*** UNIX command on the affected Cisco PGW 2200 Softswitch to run the restore script.

Note You can restore a backup file only when you are logged in to your system as *mgcusr.* You cannot restore a backup file while you are logged in as *root*.

Where:

- *path*—Directory path to the location where your backup files are stored.
- *filename*—Filename of the backup file you want to restore.

For example, to restore a backup file that is called mgc_venus_20011012_153003_backup stored in a directory path that is called /var/cisco, enter the **mgcrestore -d /var/cisco -f mgc_venus_20011012_153003_backup** command.

Restoring a Backup File from a Device

To restore the configuration data that is stored in a particular backup file that is stored on a device, such as a tape drive, enter the **mgcrestore -d *device*** UNIX command on the affected Cisco PGW 2200 Softswitch to run the restore script.

Note You can restore a backup file only when you are logged in to your system as *mgcusr.* You cannot restore a backup file while you are logged in as *root*.

Where *device* is the device where your backup files are stored.

For example, to restore a backup file that is stored on a tape drive that is called /dev/rmt/0, you would enter the **mgcrestore -d /dev/rmt/0** command.

Restoring a Backup File Using the Mgcrestore Script

You can also restore a configuration by running the mgcrestore script. To restore the configuration data that is stored in a particular backup file that is stored in a directory, perform the following steps:

Note You can restore a backup file only when you are logged in to your system as *mgcusr*. You cannot restore a backup file while you are logged in as *root*.

Step 1 Enter the **mgcrestore** UNIX command on the Cisco PGW 2200 Softswitch.

The system returns a response like the following:

```
Restore Main Menu
--------------------

Note: to exit the script at anytime use ctrl-c

1. Restore a backup
2. List Backup Files
3. Exit

Selection:
```

Step 2 Enter **1** to restore a backup file.

The system returns a response like the following:

```
Restore a Backup
------------------

NameRetriesTimeoutDayTimeDirectory
Back15  60  everyday12:00/var/cisco
Mybackup030weekdays04:00/var/cisco

Enter the name of the backup to be restored:
```

Step 3 Enter the name of the automatic backup operation you want to restore.

The system returns a response like the following:

```
Restore this backup (Y or N)?
```

Step 4 Enter **Y** if you want to continue to restore a backup, or enter **N** if you do not want to restore a backup.

Note You can enter a Ctrl-C keyboard command at any time to halt the execution of the mgcrestore script.

Verifying Proper Configuration of Replication

If calls are not being preserved when your system performs a switchover, verify that your system is properly configured to replicate call data. To verify the configuration, ensure that the value of the *.desiredPlatformState parameter in the XECfgParm.dat file on each host is either *master* or *slave* by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Configuration Export Failed Because of MMDB

If you attempt to export your configuration settings by issuing the **prov-exp:all** MML command and the MMDB is not running, the system returns a failure message. The MMDB must be running for the **prov-exp:all** MML command to function. To resolve this problem, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the active Cisco PGW 2200 Softswitch and determine whether the MMDB is running by entering the **ps -ef | grep timesten** UNIX command.

If the system returns a list of running timesten processes, such as the processes presented in the following list, the MMDB is running.

```
    root   234     1  0   Dec 21 ?        0:04 /opt/TimesTen32/32/bin/timestend
    root   235   234  0   Dec 21 ?        0:03 /opt/TimesTen32/32/bin/timestensubd -id 0
    root   236   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 1
    root   237   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 2
    root   238   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 3
    root   239   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 4
    root   240   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 5
    root   241   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 6
    root   242   234  0   Dec 21 ?        0:00 /opt/TimesTen32/32/bin/timestensubd -id 7
  mgcusr 14246 14127  0 09:19:38 pts/1    0:00 grep timesten
    root 23327   234  0   Dec 26 ?        9:44 /opt/TimesTen32/32/bin/timestenrepd -id 8
-datastore /opt/TimesTen32/datastore/
```

If the MMDB is running, proceed to Step 5. Otherwise, proceed to Step 3.

Step 3 Log in to the active Cisco PGW 2200 Softswitch as root and enter the **/etc/init.d/tt4.1_32bit start** UNIX command.

If the system response indicates that the database has started, proceed to Step 4. Otherwise, proceed to Step 5.

Step 4 Attempt to export your system configuration again by issuing the **prov-exp:all** MML command:

If the export is successful, the procedure is complete. Otherwise, proceed to Step 5.

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Measurements Are Not Being Generated

If the Cisco PGW 2200 Softswitch is not generating system measurements, perform the following procedure:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the amdmpr process is running, as described in the "Verifying That Processes Are Running" section on page 3-4.

If the amdmpr process is not running, proceed to Step 3. Otherwise, proceed to Step 4.

Step 3 Verify that the *.disableMeas parameter in the XECfgParm.dat file is set to *false* on each host by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Step 4 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Call Detail Records Are Not Being Generated

If the Cisco PGW 2200 Softswitch is not generating call detail records, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the dmpr-01 process is running, as described in the "Verifying That Processes Are Running" section on page 3-4.

If the dmpr-01 process is not running, proceed to Step 3. Otherwise, proceed to Step 5.

Step 3 Verify that the settings for the dmprSink.dat file are correct by using the procedure in the "Configuring the Data Dumper" section on page A-2.

If verifying that the settings clears the alarm, the procedure is finished. Otherwise, proceed to Step 4.

Step 4 Verify that the settings for the CDR parameters in the XECfgParm.dat file on each host match the settings of the CDR parameters that are presented in the following list. Follow the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

```
cdrDmpr.openCDR        = true
cdrDmpr.callDetail     = /opt/CiscoMGC/local/cdbscript.sh
cdrDmpr.seqFile        = ../var/.cdr.seq
diskmonitor.CdrRmFinished = 0     # remove "finished" cdrs after X days (0 = immediate)
engine.CDRencodingFormat  = AnsiCDB
engine.CDRtimeStamp  = S
engine.CDRmessageTypes   = "1010,1020,1030,1040,1050,1060,1070"
```

Step 5 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Resolving a Failed Connection to a Peer

If the Cisco PGW 2200 Softswitch loses the connection to a peer component in your network, perform the following procedure to resolve the problem:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 If your system is provisioned to control Voice over IP (VoIP) calls that do not originate or terminate on SS7 or PRI (such as SIP-to-SIP or SIP-to-EISUP/H.323 calls), you must synchronize the system state data before continuing. To synchronize the system state data, proceed to Step 3.

If your system is provisioned to control VoIP calls for which at least one call leg is SS7 or PRI, proceed to Step 4.

Step 3 To synchronize the system state data, you must restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch. To restart the Cisco PGW 2200 Softswitch software, stop the software, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4 and then start the software, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 4 Verify that the path to the affected peer is out-of-service, according to the instructions in the "Verifying the Status of all Signaling Services" section on page 3-9.

If the destination is in-service, or there is no destination that is associated with the peer, proceed to Step 5.

If the destination associated with the peer is out-of-service, restore the destination to service, as described in the "SS7 Destination is Out of Service" section on page 6-102.

Note If the out-of-service destination is an IP destination, perform the procedure that is described in "Media Gateway IP Destination or Link Out-of-Service" section on page 6-151.

If restoring the destination to service resolves the problem, this procedure is complete. Otherwise, proceed to Step 5.

Step 5 Trace the route to the peer by entering the **traceroute** ***ip_addr*** UNIX command on the active Cisco PGW 2200 Softswitch:

Where:

ip_addr—IP address of the affected peer.

The system responds with a listing of the peers that are passed through on route to the identified peer.

If the system response indicates that the identified peer was reached with no problems, proceed to Step 7.

If the system response indicates that the identified peer is unreachable, proceed to Step 6.

Step 6 Log in to the peer identified in Step 4 and verify that the Ethernet interfaces for this peer are working correctly. See the documentation for the peer for more information.

If the Ethernet interfaces are working properly, proceed to Step 7.

If the Ethernet interfaces are not working properly, replace the element that is not working properly. See the documentation of the peer for more information. If replacing the element resolves the problem, the procedure is complete. Otherwise, proceed to Step 7.

Step 7 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Rebooting Software to Modify Configuration Parameters

Sometimes you might need to change your configuration settings in the XECfgParm.dat file while the system is in-service. To change a configuration while the system is in-service, perform the following procedure:

Caution Performing this procedure stops the functioning of the Cisco PGW 2200 Softswitch software. Perform this step only while in contact with Cisco Technical Assistance Center (TAC) personnel. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for information on contacting the Cisco TAC.

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Log in to the standby Cisco PGW 2200 Softswitch and change directories to the /etc subdirectory by entering the `cd /opt/CiscoMGC/etc` UNIX command.

Step 3 Open the XECfgParm.dat by using a text editor, such as vi.

Step 4 Search for the parameters that are specified in the referring procedure and verify that they are set to the correct values. If they are set correctly, proceed to Step 11. Otherwise, proceed to Step 5 to begin the process of correcting your configuration.

Step 5 Modify the incorrect parameters that were identified in Step 4 to match the correct values.

Step 6 Save your changes and close the text editor.

Step 7 Stop the Cisco PGW 2200 Softswitch software on your standby Cisco PGW 2200 Softswitch, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 8 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Step 9 Perform a manual switchover from the active Cisco PGW 2200 Softswitch, as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are transmitted to the Cisco PGW 2200 Softswitch for approximately three seconds. The switchover affects unstable in-progress calls as well as new calls. Stable in-progress calls are not affected.

Step 10 Repeat Step 2 through Step 9 for the newly standby Cisco PGW 2200 Softswitch.

If repeating Step 2 through Step 9 resolves the problem, the procedure is complete. Otherwise, proceed to Step 10.

Step 11 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Diagnosing SNMP Failure

A variety of problems can cause the Cisco PGW 2200 Softswitch to fail to respond to SNMP requests. The Cisco PGW 2200 Softswitch uses the Sun Microsystems Solaris 8 or Solaris 10 operating system. Both Solaris 8 and Solaris 10 are 64-bit operating systems and older hardware platforms cannot support them. SNMP failure can occur if the system hardware does not meet the requirements of the Cisco PGW 2200 Softswitch software. The Cisco PGW 2200 Softswitch can have problems responding to SNMP requests if you selected the 32-bit kernel instead of the 64-bit kernel when you installed the Solaris 8 or Solaris 10 operating system. In such situations, the CIAgent application that processes SNMP functions on the Cisco PGW 2200 Softswitch might fail and is unable to restart.

To diagnose the source of the SNMP failure, perform the following procedure:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Determine whether the SNMP daemon (snmpdm) is running on your system by entering the **ps -ef | grep snmp** command.

The system should return a response like the following:

```
root 12061     1  0   Aug 27 ?        0:03 /opt/CiscoMGC/snmp/critagt -d
root 12072 12061  0   Aug 27 ?        0:00 /opt/CiscoMGC/snmp/brassagt -d
root  5233  5231  0 20:06:25 pts/2    0:00 grep snmp
root 12143 12061  0   Aug 27 ?        8:13 /opt/CiscoMGC/snmp/mib2agt -d
root 12144 12061  0   Aug 27 ?        5:54 /opt/CiscoMGC/snmp/hostagt -d
root 12145 12061  0   Aug 27 ?        0:00 /opt/CiscoMGC/snmp/fsagt -d
root 12068 12061  0   Aug 27 ?       13:38 /opt/CiscoMGC/snmp/snmpdm -tcplocal -d
```

If the response from your system does not include snmpdm, the SNMP daemon is not running.

If the SNMP daemon is not running, proceed to Step 3. Otherwise, proceed to Step 11.

Step 3 Verify that the hostname and IP address information for the Cisco PGW 2200 Softswitch system that is configured on your SNMP server is correct.

If the hostname and IP address information are incorrect, proceed to Step 4. Otherwise, proceed to Step 4.

Step 4 Modify the hostname and IP address information for the Cisco PGW 2200 Softswitch system on your SNMP server.

If modifying the hostname and IP address resolves the problem, proceed to Step 10. Otherwise, proceed to Step 5.

Step 5 Verify that the 64-bit kernel instruction sets are installed in your system by entering the **isalist** UNIX command.

The system should return a response like the following:

```
sparcv9+vis sparcv9 sparcv8plus+vis sparcv8plus sparcv8 sparcv8-fsmuld sparcv7 sparc
```

If the response from your system does not include the sparcv9+vis and sparcv9 instruction sets, the 64-bit kernel is not installed on your system.

If the response indicates that the 64-bit kernel is installed in your system, proceed to Step 11. Otherwise, proceed to Step 6.

Step 6 Re-install the operating system as described in *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*. Select the 64-bit kernel during installation.

If the operating system installs successfully, proceed to Step 7. Otherwise, proceed to Step 9.

Step 7 Repeat Step 5 to ensure that the 64-bit kernel is installed.

If the 64-bit kernel is installed, proceed to Step 8. Otherwise, proceed to Step 9.

Step 8 Re-install the Cisco PGW 2200 Softswitch software according to the instructions in *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

If the Cisco PGW 2200 Softswitch software installs successfully, proceed to Step 10. Otherwise, proceed to Step 11.

Step 9 Your system hardware is unable to support the 64-bit kernel. To operate the Cisco PGW 2200 Softswitch software, the 64-bit kernel must be installed. You must upgrade your hardware to enable your system to support the 64-bit operating system. For instructions on upgrading your hardware, see the Sun Microsystems documentation for the host platform.

After the upgrade is complete, repeat this procedure starting from Step 6. If the hardware upgrade resolves the problem, proceed to Step 10. Otherwise, proceed to Step 11.

Step 10 Repeat the preceding steps on the other Cisco PGW 2200 Softswitch in your system.

If the problem is resolved after fixing both Cisco PGW 2200 Softswitches, the procedure is complete. Otherwise, proceed to Step 11.

Step 11 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Correcting the System Time

Note Configure the Cisco PGW 2200 Softswitches to use NTP to maintain system time according to the instructions in *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

If you detect instances when the system time is incorrect, you can correct it. System time can vary depending on how system time was set on your system, and whether the Cisco PGW 2200 Softswitch records call detail records (CDRs). The following procedures explain how to correct system time:

- NTP is Not Used and the Cisco PGW 2200 Softswitch is Not the Source of the CDRs, page 6-186
- NTP is Not Used and Cisco PGW 2200 Softswitch is the Source of the CDRs, page 6-186
- NTP is Used and the Cisco PGW 2200 Softswitch is the Source of the CDRs, page 6-187

Caution It is critically important to synchronize the host system clock in a manner that does not adversely affect operating system or application processes. A rapid change of the system clock can adversely affect call processing, system logs, and CDRs.

Caution To correct the system time on the Cisco PGW 2200 Softswitches, you must log in as root. You should closely control the use of the superuser (root) password and privileges.

NTP is Not Used and the Cisco PGW 2200 Softswitch is Not the Source of the CDRs

To correct the system time when NTP is not maintaining system time, and the Cisco PGW 2200 Softswitch is not the source of the CDRs, perform the following procedure. If you perform this procedure during a maintenance period, it does not affect service.

Step 1 If the time on one Cisco PGW 2200 Softswitch is correct, proceed to Step 2. If the time is incorrect on both Cisco PGW 2200 Softswitches, proceed to Step 3.

Step 2 If the Cisco PGW 2200 Softswitch with the incorrect time is the active Cisco PGW 2200 Softswitch, perform a manual switchover, as described in the "Performing a Manual Switchover" section on page 3-96.

If the Cisco PGW 2200 Softswitch with the incorrect time is the standby Cisco PGW 2200 Softswitch, proceed to Step 3.

Step 3 Stop the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch (which has the incorrect time), as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 4 Correct the time on the standby Cisco PGW 2200 Softswitch by issuing the UNIX command **date**. For more information about the **date** command, see the man page for **date**.

Step 5 Restart the Cisco PGW 2200 Softswitch software on the standby Cisco PGW 2200 Softswitch, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

If the time was incorrect on only one of the Cisco PGW 2200 Softswitches, the procedure is complete. Otherwise, repeat Step 1 through Step 5 for the Cisco PGW 2200 Softswitch on which the time is incorrect.

NTP is Not Used and Cisco PGW 2200 Softswitch is the Source of the CDRs

To correct the system time when NTP is not maintaining system time, and the Cisco PGW 2200 Softswitch is the source of the CDRs, perform the following procedure.

Caution This procedure affects service. Performed the procedure during a maintenance period.

Step 1 Stop the Cisco PGW 2200 Softswitch software on both Cisco PGW 2200 Softswitches, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 2 Correct the time on both Cisco PGW 2200 Softswitches by issuing the UNIX command **date**. For more information about the **date** command, see the man page for **date**.

Step 3 Restart the Cisco PGW 2200 Softswitch software on both Cisco PGW 2200 Softswitches, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

NTP is Used and the Cisco PGW 2200 Softswitch is the Source of the CDRs

If the Cisco PGW 2200 Softswitch is the source of CDRs and NTP maintains system time, the system time can get out of synchronization with the NTP server only if a user with root access (which should be strictly controlled) modifies the time on an Cisco PGW 2200 Softswitch. You cannot modify the time on the NTP server. To correct the system time when an NTP server maintains system time, and the Cisco PGW 2200 Softswitch is the source of your CDRs, perform the following steps:

Caution This procedure affects service. Perform the procedure during a maintenance period.

Step 1 Stop the Cisco PGW 2200 Softswitch software on both Cisco PGW 2200 Softswitches, as described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Step 2 Reboot the Cisco PGW 2200 Softswitches, according to the Sun Microsystems documentation that came with the system. Rebooting the Cisco PGW 2200 Softswitches restarts the Xntp demon, which synchronizes the system time with the time on the NTP server.

Step 3 Restart the Cisco PGW 2200 Softswitch software on both Cisco PGW 2200 Softswitches, as described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2.

Securing Your Network

The Cisco PGW 2200 Softswitch introduces a security enhancement for your network. To enable this enhancement, you must completely install the CSCOh020 security package on your network (which can consist of Cisco PGW 2200 Softswitch, BAMS, and HSI). For the procedure for installing this security package, see *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*.

The following sections describe the process for securing your network:

- Securing the Cisco PGW 2200 Softswitch, page 6-187
- Securing Cisco BAMS, page 6-189

Securing the Cisco PGW 2200 Softswitch

Perform the following steps to secure the Cisco PGW 2200 Softswitch:

Step 1 Before you begin the process to secure the network, you must identify the last CDR that the Cisco BAMS obtained from the Cisco PGW 2200 Softswitch.

Log in to the active Cisco PGW 2200 Softswitch as **root** and enter the `# cd /opt/CiscoMGC/var/spool` UNIX command to change directories.

Step 2 Enter the **`# ls -l`** ***`cdr_yyyymmdd`*** UNIX command to verify the CDR.

Where:

yyyymmdd—Represents the current date, entered in the following format:

- *yyyy*—year
- *mm*—month
- *dd*—day

When you enter this command, the system displays a list of files.

Step 3 Check the list of files for the last finished filename, which is preceded by a period (.). Note the filename because you will need it later.

Step 4 Log in to the standby Cisco PGW 2200 Softswitch as **root** and enter the `# cd /opt/sun_install` command to change directory.

Step 5 Enter the `# toggle_ftp.sh disable filename` command to toggle FTP **off**.

Where:

filename—Name that you selected.

The system returns a response like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file
```

Step 6 Enter the `# toggle_telnet.sh disable filename` command to toggle Telnet **off**.

Where:

filename—Name that you selected.

The system returns a response like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file
```

Step 7 Log in to the active Cisco PGW 2200 Softswitch as **root** and enter the `# cd /opt/sun_install` command to change directory.

Step 8 Enter the `# toggle_ftp.sh disable filename` command to toggle FTP **off**.

Where:

filename—Name that you selected.

The system returns a response like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file
```

Step 9 Enter the `# toggle_telnet.sh disable filename` command to toggle Telnet **off**.

Where:

filename—Name that you selected.

The system returns a response like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file
```

Step 10 Verify that Telnet and FTP are off. Telnet or FTP to your active Cisco PGW 2200 Softswitch. If Telnet and FTP are turned off, the system displays the following error message:

```
Connection refused.
```

The procedures for securing the Cisco PGW 2200 Softswitch is complete. If you have BAMS on your network, continue to the "Securing Cisco BAMS" section on page 6-189.

Securing Cisco BAMS

To secure Cisco BAMS on your network:

Step 1 Log in to the standby Cisco BAMS by enter the following command:

```
% bams
```

Step 2 The following steps require you to use MML commands. To use MML commands, enter the following command:

```
% mml
```

Step 3 Enter the node of the Cisco PGW 2200 Softswitch that you want to change. At the MML command line, type the following and press **Enter**:

```
<bams hostname> set-mode:<x>:
```

Where <***x***> is a number between 1 through 8.

Note In this example, the node number is **2**.

Step 4 Check for alarms by entering the following command:

```
<bams hostname> rtrv-alms
```

The system returns a response like the following:

```
Billing and Measurements Server - BAMS-00 2003-02-12 15:12:05
B  RTRV
02/12/03 14:58:14 *C POL402: Cannot connect to unit va-hoover
02/12/03 15:00:15 *C POL401: Max FTP failures for one file reached
02/12/03 15:00:25 *C POL402: Cannot connect to unit va-hoover_b
02/12/03 15:02:36 *C POL402: Cannot connect to unit va-fish
02/12/03 15:04:46 *C POL402: Cannot connect to unit va-fish_b
   ;
B  COMPLD
   ;
```

Note Look for the line containing **POL402**, which indicates the presence of an alarm. Proceed to Step 5.

In the example of the displayed text, “va-hoover” and “va-fish” are Cisco PGW 2200 Softswitch and Cisco BAMS hostnames.

Step 5 Log in as **root**.

Step 6 Type the following command and press **Enter** to change directory:

```
# cd /opt/sun_install
```

Step 7 Type the following command to toggle FTP off:

```
# toggle_ftp.sh disable <filename>
```

Note <*filename*> is a name that you select.

The system displays text like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file

Done!
```

Step 8 Type the following command and press **Enter** to toggle Telnet **off**:

```
# toggle_telnet.sh disable <filename>
```

Note <*filename*> is a name that you select.

The system displays text like the following:

```
You are running as root - Good...
Operating System: SunOS 5.8
Disable ftp in inetd.conf file

Done!
```

Step 9 On the active host (BAMS 1), log in as **bams.**

Step 10 Repeat Step 2 through Step 8.

Step 11 On the standby Cisco BAMS, while logged in as **root**, type the following command and press **Enter** to change the directory:

```
# cd /opt/sun_install
```

Step 12 As **root**, enter the following command to set up the SSH process:

```
# setupSSH.sh
```

The system displays text like the following:

```
BAMS is installed, proceeding with SSH configuration
Warning:
Before running this script, SSH must be installed on all PGW and BAMS hosts

This script will disable the standard FTP client on BAMS and set up
 SSH connections from BAMS to PGW and from BAMS to BAMS.

If you want to use the standard FTP client, it is still available
in the file /usr/bin/ftp.orig

Do you want to continue [y/n]:
```

Step 13 Enter **y** (yes) to continue and press **Enter**.

The system displays text like the following:

```
Sun Microsystems Inc.   SunOS 5.6       Generic August 1997
Warning:
Before running this script, SSH must be installed on all PGW and BAMS hosts.

This script will reset the existing known hostkeys
and user keys for bams user for each host entered during this session.
You need to run this script every time the PGW or BAMS is re-installed.
You also need to run this script if SSH is re-installed on PGW or BAMS.

Do you want to continue [y/n]:
```

Step 14 Enter **y** (yes) to continue and press **Enter**.

The system displays text like the following:

```
Generating security keys, this will take a couple of minutes...
Generating public/private rsa key pair.
Your identification has been saved in /opt/CiscoBAMS/local/.ssh/id_rsa.
Your public key has been saved in /opt/CiscoBAMS/local/.ssh/id_rsa.pub.
The key fingerprint is:
32:8e:10:10:98:2a:35:8a:18:bb:e6:3e:a1:54:d9:27 bams@va-pine
Generating public/private dsa key pair.
Your identification has been saved in /opt/CiscoBAMS/local/.ssh/id_dsa.
Your public key has been saved in /opt/CiscoBAMS/local/.ssh/id_dsa.pub.
The key fingerprint is:
32:dd:2d:51:e3:b4:9b:41:29:49:1a:f2:49:6f:e4:29 bams@va-pine

You will be prompted for the user name and password for each PGW
or BAMS host.
Please remember to enter both PGW host names for a failover pair.
You also need to enter the other BAMS host if this is a redundant setup.

Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 15 Enter hostname **PGW1** and press **Enter**.

The system displays text like the following:

```
Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 16 Enter the hostname **mgcusr** (the login name of **PGW1**) and press **Enter**.

The system displays text like the following:

```
Are you sure you want to continue connecting (yes/no)? yes
```

Step 17 Enter **y** (yes) and press **Enter.**

The system displays text like the following:

```
mgcusr@<hostname>'s password:
id_dsa.pub           100% |****************************|   602       00:00
```

Step 18 Enter the password and press **Enter.**

The system displays text like the following:

```
mgcusr@<BAMS 1>'s password:
```

Step 19 Enter **y** (yes) again and press **Enter.**

The system displays text like the following:

```
mgcusr on <BAMS> successfully configured

Do you want to configure second interface for <BAMS>? n
```

Step 20 You can answer either **y (yes)** or **n** (no):

- **Yes** (configuring a second interface) is **optional**. If you answer **y**, repeat Step 1 through Step 19**.**
- If you answer **no**, proceed to Step 21.

Step 21 Repeat Step 15 through Step 19 for additional Cisco PGW 2200 Softswitch nodes.

The system displays text like the following:

```
mgcusr on <BAMS1> successfully configured

Do you want to configure second interface for <BAMS1>? n
```

Step 22 Enter **n** (no) and press Enter.

The system displays text like the following:

```
Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 23 Continuing on the standby Cisco BAMS, type the active Cisco BAMS unit information (Cisco BAMS name, Cisco BAMS login password).

Step 24 When all the Cisco BAMS interfaces have been configured, type **q** to quit and press **Enter**.

The system displays text like the following:

```
Done
```

Note Watch for the following error message. If some hosts are not configured, follow the recommendation in this message.

Failed to configure some hosts. Please check for SSH installation on these hosts and/or the username and password for these hosts.

Step 25 Log in to the active Cisco BAMS as **root**.

Step 26 Change the directory. Type the following command and press **Enter**:

```
# cd /opt/install
```

Step 27 Enter the following command and press **Enter**:

```
# setupSSH.sh
```

The system displays text like the following:

```
BAMS is installed, proceeding with SSH configuration
Warning:
Before running this script, SSH must be installed on all PGW and BAMS hosts

This script will disable the standard FTP client on BAMS and set up
 SSH connections from BAMS to PGW and from BAMS to BAMS.

If you want to use the standard FTP client, it is still available
in the file /usr/bin/ftp.orig

Do you want to continue [y/n]:
```

Step 28 Enter **y** to continue and press **Enter**.

The system displays text like the following:

```
Sun Microsystems Inc.   SunOS 5.6       Generic August 1997
Warning:
Before running this script, SSH must be installed on all PGW and BAMS hosts.

This script will reset the existing known hostkeys
and user keys for bams user for each host entered during this session.
You need to run this script every time the PGW or BAMS is re-installed.
You also need to run this script if SSH is re-installed on PGW or BAMS.

Do you want to continue [y/n]:
```

Step 29 Enter **y** (yes) to continue and press **Enter**.

The system displays text like the following:

```
Generating security keys, this will take a couple of minutes...
Generating public/private rsa key pair.
Your identification has been saved in /opt/CiscoBAMS/local/.ssh/id_rsa.
Your public key has been saved in /opt/CiscoBAMS/local/.ssh/id_rsa.pub.
The key fingerprint is:
32:8e:10:10:98:2a:35:8a:18:bb:e6:3e:a1:54:d9:27 bams@va-pine
Generating public/private dsa key pair.
Your identification has been saved in /opt/CiscoBAMS/local/.ssh/id_dsa.
Your public key has been saved in /opt/CiscoBAMS/local/.ssh/id_dsa.pub.
The key fingerprint is:
32:dd:2d:51:e3:b4:9b:41:29:49:1a:f2:49:6f:e4:29 bams@va-pine

You will be prompted for the user name and password for each PGW
or BAMS host.
Please remember to enter both PGW host names for a failover pair.
You also need to enter the other BAMS host if this is a redundant setup.

Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 30 Enter hostname **PGW1** and press **Enter**.

The system displays text like the following:

```
Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 31 Enter the hostname **mgcusr** (the login name of **PGW1**) and press **Enter**.

The system displays text like the following:

```
Are you sure you want to continue connecting (yes/no)? yes
```

Step 32 Enter **y** (yes) and press **Enter.**

The system displays text like the following:

```
mgcusr@<hostname>'s password:
id_dsa.pub           100% |*****************************|   602       00:00
```

Type the password and press **Enter.**

The system displays text like the following:

```
mgcusr@<BAMS 1>'s password:
```

Step 33 Enter **y** (yes) again and press **Enter.**

The system displays text like the following:

```
mgcusr on <BAMS> successfully configured

Do you want to configure second interface for <BAMS>? n
```

Step 34 You can answer either **y (yes)** or **n** (no):

- **Yes** (configuring a second interface) is **optional**. If you answer **y**, repeat Step 1 through Step 19**.**
- If you answer **no**, proceed to Step 21.

Step 35 Repeat Step 15 through Step 19 for additional Cisco PGW 2200 Softswitch nodes.

The system displays text like the following:

```
mgcusr on <BAMS1> successfully configured

Do you want to configure second interface for <BAMS1>? n
```

Step 36 Enter **n** (no) and press **Enter**.

The system displays text like the following:

```
Please enter a PGW or BAMS host name, or q to quit
Enter a host name now:
```

Step 37 Continuing on the active Cisco BAMS, enter the standby Cisco BAMS unit information (Cisco BAMS name, Cisco BAMS login password).

Step 38 When all the Cisco BAMS interfaces are configured, type **q** to quit and press **Enter**.

The system displays text like the following:

```
Done
```

Step 39 Go to the active Cisco PGW 2200 Softswitch (Host A) in the "Securing the Cisco PGW 2200 Softswitch" section on page 6-187 and repeat Step 1 and Step 2.

The system displays text like the following:

```
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:29 cdr_20030212142403_037281.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:34 cdr_20030212142903_037282.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:39 cdr_20030212143403_037283.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:44 cdr_20030212143903_037284.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:49 cdr_20030212144403_037285.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:54 cdr_20030212144903_037286.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 14:59 cdr_20030212145403_037287.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:04 cdr_20030212145903_037288.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:09 cdr_20030212150403_037289.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:14 cdr_20030212150903_037290.finished
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:19 cdr_20030212151403_037291.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:24 cdr_20030212151904_037292.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:30 cdr_20030212152434_037293.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:35 cdr_20030212153004_037294.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:40 cdr_20030212153504_037295.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:45 cdr_20030212154004_037296.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:50 cdr_20030212154504_037297.bin
-rw-rw-r--   1 mgcusr   mgcgrp       182 Feb 12 15:55 cdr_20030212155004_037298.bin
```

Step 40 Ensure that the CDR file number you noted in Step 3 has changed from **.bin** to **.finished**.

Step 41 Check for alarms on the Cisco BAMS. Enter the following command and press **Enter**:

```
<bams hostname> rtrv-alms
```

The system displays text like the following:

```
Billing and Measurements Server - BAMS-00 2003-02-12 16:02:08
B  RTRV
02/12/03 15:02:36 *C POL402: Cannot connect to unit <bams1 hostname>
02/12/03 15:04:46 *C POL402: Cannot connect to unit <bams2 hostname>
   ;
B  COMPLD
```

Note The CDR file **POL402** (which indicates the presence of an alarm that is shown in Step 4) for the active Cisco PGW 2200 Softswitch and standby Cisco BAMS should be gone.

Step 42 Verify that both BAMS 1 and BAMS 2 are communicating with each other.

CDR file **POL329** indicates that the active Cisco BAMS (BAMS 1) is sending information to the standby Cisco BAMS (BAMS 2).

Note Because Cisco BAMS polls the Cisco PGW 2200 Softswitch at regular intervals, you might continue to see an alarm for a while. When you do, wait a few minutes and check the logs (see Step 43).

Step 43 To check the logs for alarms (the log name within this directory is **syslog**), change directory to the following:

```
# cd /opt/CiscoBAMS/files/s0x
```

Note ***x*** in **s0*x*** is the current node in which you are operating.

The process for securing your network is now complete.

TIBCO Interface Not Working

The TIBCO interface enables you to use a TIBCO management system to add, modify, delete, and retrieve provisioning data from the Cisco PGW 2200 Softswitch. If you are experiencing difficulties with the TIBCO interface, perform the following steps:

Step 1 If you have not already collected system data, refer to the method that is described in the "Collecting System Data for Cisco TAC" section on page 6-93.

Step 2 Verify that the TIBCO adapter daemon is running by entering the following UNIX command on the active Cisco PGW 2200 Softswitch:

```
ps -ef
```

The system returns a response like the following:

```
UID   PID  PPID  C    STIME TTY      TIME CMD
root     0     0  0 10:28:20 ?        0:00 sched
root     1     0  0 10:28:20 ?        0:27 /etc/init -
mgcusr 14437 14427  0 13:57:19 ?        0:00 /opt/CiscoMGC/bin/perl
/opt/CiscoMGC/local/tibAdapter.pl
mgcusr 14427     1  0 13:57:18 ?        0:00 -csh -c /opt/CiscoMGC/local/tibAdapter.pl
```

If the daemon is running, proceed to Step 9. Otherwise, proceed to Step 3.

Note If your system is also equipped with an SNMP interface, the Cisco PGW 2200 Softswitch generates a trap when the software cannot start the TIBCO daemon.

Step 3 Log in to the standby Cisco PGW 2200 Softswitch as root and change directories to the /etc subdirectory by entering the following UNIX command:

```
cd /opt/CiscoMGC/etc
```

Step 4 Open the XECfgParm.dat file by using a text editor, such as vi.

Step 5 Search for the **.tibcoSupport* parameter and verify that it is set to **enable**. If it is set properly, exit the text editor and proceed to Step 9. Otherwise, proceed to Step 6.

Step 6 Change the **.tibcoSupport* parameter to **enable** by using the procedure in the "Rebooting Software to Modify Configuration Parameters" section on page 6-183.

Step 7 Verify that the TIBCO adapter daemon is running by entering the following UNIX command on the active Cisco PGW 2200 Softswitch:

```
ps -ef
```

The system returns a response like the following:

```
UID   PID  PPID  C    STIME TTY      TIME CMD
root     0     0  0 10:28:20 ?        0:00 sched
root     1     0  0 10:28:20 ?        0:27 /etc/init -
mgcusr 14437 14427  0 13:57:19 ?        0:00 /opt/CiscoMGC/bin/perl
/opt/CiscoMGC/local/tibAdapter.pl
mgcusr 14427     1  0 13:57:18 ?        0:00 -csh -c /opt/CiscoMGC/local/tibAdapter.pl
```

If the daemon is running, proceed to Step 8. Otherwise, proceed to Step 9.

Step 8 Repeat Step 3 through Step 7 for the newly standby Cisco PGW 2200 Softswitch. If repeating Step 3 through Step 7 resolves the problem, the procedure is finished. Otherwise, proceed to Step 9.

Step 9 Contact the Cisco TAC to analyze the problem further and to determine a solution. For more information about contacting the Cisco TAC, see the "Obtaining Documentation and Submitting a Service Request" section on page xviii.

Installing the License File

See the detailed procedure in Chapter 3, "Installing Cisco PGW 2200 Softswitch Software," in the *Cisco PGW 2200 Softswitch Release 9.8 Software Installation and Configuration Guide*:

http://www.cisco.com/en/US/docs/voice_ip_comm/pgw/9.8/Installation/Guide/Install98.html

Replacing a Failed Disk

This section describes the process for replacing a defective Cisco PGW 2200 Softswitch disk. Each Cisco Cisco PGW 2200 Softswitch system element contains two hard disks (disk 0 and disk 1) that are mirrored using Sun Solaris Disk Suite. You must disable the disk mirroring application between the two disks to replace the defective disk.

Before you start to replace a disk, you must complete the following procedures:

- Identify the disk that must be replaced by viewing the /var/adm/messages.
- The new disk part number must be the same as the defective disk and the size of the replacement disk must be equal to the good disk.

To replace a failed disk on Cisco PGW 2200 Softswitch, perform the following procedure:

Step 1 Enter the following command and press **Enter** to check the status of DiskSuite objects.

```
# metastat -i
```

The system displays text like the following:

```
d12: Mirror
    Submirror 0: d10
      State: Okay
    Submirror 1: d11
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 259963830 blocks (123 GB)

d10: Submirror of d12
    State: Okay
    Size: 259963830 blocks (123 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s5           0     No            Okay   Yes


d11: Submirror of d12
    State: Needs maintenance
    Invoke: metareplace d12 c3t1d0s5 <new device>
    Size: 259963830 blocks (123 GB)
Stripe 0:

        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s5           0     No     Maintenance   Yes


d9: Mirror
    Submirror 0: d7
      State: Okay
    Submirror 1: d8
```

```
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 8193150 blocks (3.9 GB)

d7: Submirror of d9
    State: Okay
    Size: 8193150 blocks (3.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s3          0     No            Okay   Yes


d8: Submirror of d9
    State: Needs maintenance
    Invoke: metareplace d9 c3t1d0s3 <new device>
    Size: 8193150 blocks (3.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s3          0     No     Maintenance   Yes


d6: Mirror
    Submirror 0: d4
      State: Okay
    Submirror 1: d5
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
Size: 10249470 blocks (4.9 GB)


d4: Submirror of d6
    State: Okay
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s1          0     No            Okay   Yes


d5: Submirror of d6
    State: Needs maintenance
    Invoke: metareplace d6 c3t1d0s1 <new device>
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s1          0     No     Maintenance   Yes


d3: Mirror
    Submirror 0: d1
      State: Okay
    Submirror 1: d2
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d1: Submirror of d3
    State: Okay
    Size: 4096575 blocks (2.0 GB)
```

```
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s0          0     No            Okay   Yes


d2: Submirror of d3
    State: Needs maintenance
    Invoke: metareplace d3 c3t1d0s0 <new device>
Size: 4096575 blocks (2.0 GB)

    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s0          0     No     Maintenance   Yes


d15: Mirror
    Submirror 0: d13
      State: Okay
    Submirror 1: d14
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d13: Submirror of d15
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s6          0     No            Okay   Yes


d14: Submirror of d15
    State: Needs maintenance
    Invoke: metareplace d15 c3t1d0s6 <new device>
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s6          0     No     Maintenance   Yes


Device Relocation Information:
Device   Reloc  Device ID
c3t1d0   Yes    id1,sd@n5000c5000914e78b
c3t0d0   Yes    id1,sd@n5000c50008cc7c13
```

Step 2 Delete state database replicas (indicated with State: Needs maintenance) of the defective disk by using the following command:

```
# metadb -d c3t1d0s4
```

Step 3 Reboot the Cisco PGW 2200 Softswitch.

```
# reboot -- -r
```

Step 4 Remove the defective disk from the Cisco PGW 2200 Softswitch.

Step 5 Insert the new disk into the Cisco PGW 2200 Softswitch.

Step 6 Detect the new disk by issuing the following command:

```
# devfsadm
```

Step 7 Display the available disk information by issuing the following command:

```
# format
```

The system displays text like the following:

(Use Ctrl-C to exit.)

```
Searching for disks...done


AVAILABLE DISK SELECTIONS:
       0. c3t0d0 <DEFAULT cyl 17845 alt 2 hd 255 sec 63>
          /pci@79,0/pci1022,7458@11/pci1000,3060@2/sd@0,0
       1. c3t1d0 <DEFAULT cyl 17845 alt 2 hd 255 sec 63>
          /pci@79,0/pci1022,7458@11/pci1000,3060@2/sd@1,0
Specify disk (enter its number):
```

Step 8 Enter the following command to check the status of DiskSuite objects.

```
# metastat -i
```

The system displays text like the following:

```
d12: Mirror
    Submirror 0: d10
      State: Okay
    Submirror 1: d11
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 259963830 blocks (123 GB)

d10: Submirror of d12
    State: Okay
    Size: 259963830 blocks (123 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s5          0     No            Okay   Yes


d11: Submirror of d12
    State: Needs maintenance
    Invoke: metareplace d12 c3t1d0s5 <new device>
    Size: 259963830 blocks (123 GB)
Stripe 0:

        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s5          0     No     Maintenance   Yes


d9: Mirror
    Submirror 0: d7
      State: Okay
    Submirror 1: d8
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 8193150 blocks (3.9 GB)

d7: Submirror of d9
    State: Okay
    Size: 8193150 blocks (3.9 GB)
```

```
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s3           0     No            Okay   Yes


d8: Submirror of d9
    State: Needs maintenance
    Invoke: metareplace d9 c3t1d0s3 <new device>
    Size: 8193150 blocks (3.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s3           0     No     Maintenance   Yes


d6: Mirror
    Submirror 0: d4
      State: Okay
    Submirror 1: d5
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
Size: 10249470 blocks (4.9 GB)


d4: Submirror of d6
    State: Okay
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s1           0     No            Okay   Yes


d5: Submirror of d6
    State: Needs maintenance
    Invoke: metareplace d6 c3t1d0s1 <new device>
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s1           0     No     Maintenance   Yes


d3: Mirror
    Submirror 0: d1
      State: Okay
    Submirror 1: d2
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d1: Submirror of d3
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s0           0     No            Okay   Yes


d2: Submirror of d3
    State: Needs maintenance
    Invoke: metareplace d3 c3t1d0s0 <new device>
Size: 4096575 blocks (2.0 GB)
```

```
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s0          0     No     Maintenance   Yes


d15: Mirror
    Submirror 0: d13
      State: Okay
    Submirror 1: d14
      State: Needs maintenance
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d13: Submirror of d15
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s6          0     No            Okay   Yes


d14: Submirror of d15
    State: Needs maintenance
    Invoke: metareplace d15 c3t1d0s6 <new device>
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s6          0     No     Maintenance   Yes


Device Relocation Information:
Device   Reloc  Device ID
c3t0d0   Yes    id1,sd@n5000c50008cc7c13
```

Step 9 Import the volume table of contents from the existing disk to the new disk by issuing the following command:

```
# prtvtoc /dev/rdsk/c3t0d0s2 | fmthard -s - /dev/rdsk/c3t1d0s2
```

The system displays text like the following:

```
fmthard:  New volume table of contents now in place.
```

Step 10 Create the initial state database by issuing the following command:

```
# metadb -f -a /dev/dsk/c3t1d0s4
```

Step 11 Display the status of the disk state databases by issuing the following command:

```
# metadb -i
```

The system displays text like the following:

```
        flags           first blk       block count
     a m  p  luo        16              8192            /dev/dsk/c3t0d0s4
     a        u         16              8192            /dev/dsk/c3t1d0s4
 r - replica does not have device relocation information
 o - replica active prior to last mddb configuration change
 u - replica is up to date
 l - locator for this replica was read successfully
 c - replica's location was in /etc/lvm/mddb.cf
 p - replica's location was patched in kernel
```

```
 m - replica is master, this is replica selected as input
 W - replica has device write errors
 a - replica is active, commits are occurring to this replica
 M - replica had problem with master blocks
 D - replica had problem with data blocks
 F - replica had format problems
 S - replica is too small to hold current data base
 R - replica had device read errors
```

Step 12 Enter the following commands to enable the mirror and submirror components that require maintenance (shown in Step 8).

```
# metareplace -e d15 c3t1d0s6
# metareplace -e d12 c3t1d0s5
# metareplace -e d9 c3t1d0s3
# metareplace -e d6 c3t1d0s1
# metareplace -e d3 c3t1d0s0
```

Step 13 Verify that the status of DiskSuite objects is okay using the following command:

```
# metastat -i
```

The system displays text like the following:

```
d12: Mirror
    Submirror 0: d10
      State: Okay
    Submirror 1: d11
      State: Okay
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 259963830 blocks (123 GB)

d10: Submirror of d12
    State: Okay
    Size: 259963830 blocks (123 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s5          0     No            Okay   Yes


d11: Submirror of d12
    State: Okay
    Size: 259963830 blocks (123 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s5          0     No            Okay   Yes


d9: Mirror
    Submirror 0: d7
      State: Okay
    Submirror 1: d8
      State: Okay
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
Size: 8193150 blocks (3.9 GB)

d7: Submirror of d9
    State: Okay
    Size: 8193150 blocks (3.9 GB)
    Stripe 0:
```

```
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s3          0     No            Okay   Yes


d8: Submirror of d9
    State: Okay
    Size: 8193150 blocks (3.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s3          0     No            Okay   Yes


d6: Mirror
    Submirror 0: d4
      State: Okay
    Submirror 1: d5
      State: Okay
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 10249470 blocks (4.9 GB)

d4: Submirror of d6
    State: Okay
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s1          0     No            Okay   Yes


d5: Submirror of d6
    State: Okay
    Size: 10249470 blocks (4.9 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s1          0     No            Okay   Yes


d3: Mirror
    Submirror 0: d1
      State: Okay
    Submirror 1: d2
      State: Okay
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d1: Submirror of d3
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s0          0     No            Okay   Yes


d2: Submirror of d3
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s0          0     No            Okay   Yes
```

```
d15: Mirror
    Submirror 0: d13
      State: Okay
    Submirror 1: d14
      State: Okay
    Pass: 1
    Read option: roundrobin (default)
    Write option: parallel (default)
    Size: 4096575 blocks (2.0 GB)

d13: Submirror of d15
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t0d0s6          0     No            Okay   Yes


d14: Submirror of d15
    State: Okay
    Size: 4096575 blocks (2.0 GB)
    Stripe 0:
        Device     Start Block  Dbase        State Reloc Hot Spare
        c3t1d0s6          0     No            Okay   Yes


Device Relocation Information:
Device   Reloc  Device ID
c3t1d0   Yes    id1,sd@n5000c5000914e78b
c3t0d0   Yes    id1,sd@n5000c50008cc7c13
```

APPENDIX A

Configuring Cisco PGW 2200 Softswitch Log Files

Revised: March 7, 2011, OL-0800-14

This appendix describes the Cisco PGW 2200 Softswitch log files and the associated procedures for setting up the data dumper. The data dumper controls how files are processed for three of the log-file types. The logs records statistical information about the calls that the system processed. The logs also record network events, such as delays or service-affecting conditions.

Understanding Logging Files

A log message consists of several fields. See *Cisco PGW 2200 Softswitch Release 9 Messages Reference* for detailed information on specific fields and valid values in log files.

Table A-1 lists the log file types for the Cisco PGW 2200 Softswitch software. The Cisco PGW 2200 Softswitch creates these log files and stores them in the $BASEDIR/var/log directory, unless otherwise noted.

Table A-1 Log File Types

Log File Type	Active Name	Archived Name	Description
System	platform.log	platform_*yyyymmddhhmmss*.log	Contains log messages of varying severity that the system generates.
Command	mml.log	MML_*yyyymmddhhmmss*.log	Man-Machine Language (MML) command category log messages.
Alarms	alm.csv	alm_*yyyymmddhhmmss_seq#*.csv	Alarm category log messages. Archived files are stored in the $BASEDIR/var/spool directory.
Measurements	meas.csv	meas_*yyyymmddhhmmss_seq#*.csv	Measurement category log messages. Archived files are stored in the $BASEDIR/var/spool directory.
Call Detail Records (CDRs)	cdr.bin	cdr_*yyyymmddhhmmss_seq#*.bin	CDRs rotated on a regular basis. Archived files are stored in the $BASEDIR/var/spool directory.

Note The time stamps that are added to the archived filenames (*yyyymmddhhmmss*) are in system time.

Configuring the Data Dumper

The Cisco PGW 2200 Softswitch software contains a function that is called the data dumper. The data dumper controls the destinations for active and archived log files for CDRs, measurements, and alarms. It also controls when the active files are archived. The data dumper runs automatically and works correctly with a default configuration. However, you can customize the dumper settings by editing the **dmprSink.dat** file. Here is an example of the contents of the dmprSink.dat file:

```
"callDetail" bin "cdr" "../var/log" "../var/spool" 1000 0 15
"measReport" csv "meas" "../var/log" "../var/spool" 500 0 15
"almState" csv "alm" "../var/log" "../var/spool" 500 0 15
```

The contents of the dmprSink.dat file displays the log file setup data for each of these three log-file types. There are eight fields for each log file type in the file. You can modify the last three fields in each line to manage the creation of these three log-file types.

Caution Do *not* modify any of the first five fields in each line.

The first field in each line identifies the log file type, such as *callDetail* for the CDR log files. The second field in each line identifies the storage format that is used in the log file. The storage format is either *bin* for binary, or *csv* for comma-separated-value. The third field identifies the filename that is used to identify the file type, such as *meas* for system measurements. The fourth field identifies the directory in which the active log file is stored. The fifth field identifies the directory in which the archived log files are stored.

Table A-2 describes the last three fields in each line, which you can modify, depending on your needs.

Note You *must* set at least one of the last three fields in each line to a value other than zero (0) to enable logging to function properly.

Table A-2 Dumper Sink Log File Parameters

Field Number	Default Value	Description
6	1000	Defines the maximum number of records a file can contain before it is flushed or moved to the spool directory. If this value is set to 0, the number of records is unlimited. You can improve system performance by increasing the value of this field to a larger value, such as 50000. The larger value causes the generation of fewer log files during periods of high call volume. **Note** For CDRs, the value in this field refers to the maximum number of call detail blocks (CDBs), which make up CDRs. The system can create multiple CDBs for each call. For more information on individual CDBs, see *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*.

Table A-2 Dumper Sink Log File Parameters (continued)

Field Number	Default Value	Description
7	0	Defines the maximum size of the log file in bytes before it is moved to the spool directory. If this value is set to 0, the available disk space is the only factor that limits the size of the file.
8	15	Defines the maximum time, in minutes, the file is allowed to remain open, before it is flushed or moved to the spool directory. If there is no data in the file, it is not flushed when the time limit expires. If you set this value to 0, there is no time limit.

Note Starting with Release 9.3(2), empty alarm log files are no longer archived, and CDR log files are not archived to the standby Cisco PGW 2200 Softswitch. In prior releases, empty alarm log files and CDR log files would be archived on both Cisco PGW 2200 Softswitches.

To configure the **dmprSink.dat** file fields, use this procedure:

Step 1 Log in to the active Cisco PGW 2200 Softswitch and change to the /opt/CiscoMGC/etc directory by entering the following UNIX command:

```
cd /opt/CiscoMGC/etc
```

Step 2 Use a text editor, such as vi, to open and edit the **dmprSink.dat** file fields that you want to change.

Note If you intend to use the BAMS to collect CDRs, proceed to the "Configuring the Data Dumper to Support BAMS" section on page A-4, for information on how to configure the data dumper to support BAMS.

Step 3 Save your changes and exit the text editor.

Step 4 Change to the /opt/CiscoMGC/etc/active_link directory by entering the following UNIX command:

```
cd /opt/CiscoMGC/etc/active_link/
```

Step 5 Repeat steps 2 and 3 for the version of dmprSink.dat stored in this directory.

Step 6 If your system uses a continuous service configuration (including an active and standby Cisco PGW 2200 Softswitch), perform Step 9, Step 10, and Step 11 to update the settings on the standby Cisco PGW 2200 Softswitch and to load the new dmprSink.dat settings.

If your system uses a simplex configuration (a single Cisco PGW 2200 Softswitch), perform steps 7 and 8 to load the new dmprSink.dat settings.

Step 7 Stop the Cisco PGW 2200 Softswitch software by using the procedure that is described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Caution Stop the Cisco PGW 2200 Softswitch software only while in contact with Cisco Technical Assistance Center (TAC) personnel. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for information on contacting the Cisco TAC.

Step 8 Restart the Cisco PGW 2200 Softswitch software by using the procedure that is described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2. The procedure is complete.

Step 9 Repeat Step 1 through Step 5 on your standby Cisco PGW 2200 Softswitch.

Step 10 Log on to the active Cisco PGW 2200 Softswitch, start an MML session and perform a manual switchover as described in the "Performing a Manual Switchover" section on page 3-96.

Warning **Switchover operations cause the loss of all SS7 messages that are transmitted to the Cisco PGW 2200 Softswitch for approximately 3 seconds. This switchover affects in-progress as well as new calls.**

Step 11 Once the manual switchover is complete, repeat Step 10 on the newly active Cisco PGW 2200 Softswitch. The procedure is complete.

Configuring the Data Dumper to Support BAMS

If you intend to use the Billing and Measurements Server (BAMS) to retrieve CDRs from the Cisco PGW 2200 Softswitch, perform the following procedure to configure the data dumper to support the BAMS:

Step 1 Log into the active Cisco PGW 2200 Softswitch and change to the /opt/CiscoMGC/etc directory by entering the following UNIX command:

```
cd /opt/CiscoMGC/etc
```

Step 2 Use a text editor, such as vi, to open the dmprSink.dat file.

Step 3 In the callDetail line of the file, find the following directory path:

```
"../var/spool"
```

Step 4 Modify that directory path to point to the /opt/CiscoMGC/var/bam directory, as shown by the following directory path:

```
"../var/bam"
```

Step 5 Save your changes and exit the text editor.

Step 6 Change to the /opt/CiscoMGC/etc/active_link directory by entering the following UNIX command:

```
cd /opt/CiscoMGC/etc/active_link/
```

Step 7 Repeat Step 2 through Step 5 for the version of dmprSink.dat stored in this directory.

Step 8 If your system uses a continuous service configuration (including an active and standby Cisco PGW 2200 Softswitch), perform Step 11, Step 12, and Step 13 to update the settings on the standby Cisco PGW 2200 Softswitch and to load the new dmprSink.dat settings.

If your system uses a simplex configuration (a single Cisco PGW 2200 Softswitch), perform Step 9 and Step 10 to load the new dmprSink.dat settings.

Step 9 Stop the Cisco PGW 2200 Softswitch software by using the procedure that is described in the "Shutting Down the Cisco PGW 2200 Softswitch Software Manually" section on page 2-4.

Caution Stop the Cisco PGW 2200 Softswitch software only while in contact with Cisco Technical Assistance Center (TAC) personnel. See the "Obtaining Documentation and Submitting a Service Request" section on page xviii for information on contacting the Cisco TAC.

Step 10 Restart the Cisco PGW 2200 Softswitch software using the procedure that is described in the "Starting the Cisco PGW 2200 Softswitch Software" section on page 2-2. The procedure is complete.

Step 11 Repeat Step 1 through Step 7 on your standby Cisco PGW 2200 Softswitch.

Step 12 Log on to the active Cisco PGW 2200 Softswitch, start an MML session and perform a manual switchover as described in the "Performing a Manual Switchover" section on page 3-96.

Caution Switchover operations cause the loss of all SS7 messages that are transmitted to the Cisco PGW 2200 Softswitch for approximately three seconds. This switchover affects in-progress as well as new calls.

Step 13 Once the manual switchover is complete, repeat Step 10 on the newly active Cisco PGW 2200 Softswitch. The procedure is complete.

Understanding the Format of Log Files Archived Using Data Dumper

Three log-file types are archived in the $BASEDIR/var/spool directory using the data dumper: alarms, measurements, and CDRs. The archive files for alarms and measurements are stored as ASCII text files. This section describes the format of these files. CDRs are stored as binary files and are not discussed here. For a description of the elements of CDR files, see *Cisco PGW 2200 Softswitch Release 9 Billing Interface Guide*.

The following sample shows the content of an archived alarm file:

```
0,1012522984,761,1,0,"Failover daemon in INIT state","FOD-01","unknown"
0,1012522989,880,1,0,"Failover daemon in SLAVE state","FOD-01","unknown"
0,1012522991,893,1,1,"Warm Start Initiated","IOCM-01","IosChanMgr"
0,1012522992,932,0,0,"Excessive bit error ratio detected from frame alignment
signal","enif1","IosChanMgr"
0,1012522992,936,0,0,"Excessive bit error ratio detected from frame alignment
signal","enif2","IosChanMgr"
0,1012522992,939,0,0,"Reset Config Failed","dpc1","IosChanMgr"
0,1012522992,939,1,2,"Point Code Unavailable","dpc1","IosChanMgr"
0,1012522992,958,0,0,"Reset Config Failed","dpc2","IosChanMgr"
0,1012522992,958,1,2,"Point Code Unavailable","dpc2","IosChanMgr"
0,1012522992,975,0,0,"Reset Config Failed","dpc-11","IosChanMgr"
0,1012522992,975,1,2,"Point Code Unavailable","dpc-11","IosChanMgr"
0,1012522993,37,0,0,"Reset Config Failed","dpc-12","IosChanMgr"
0,1012522993,38,1,2,"Point Code Unavailable","dpc-12","IosChanMgr"
0,1012522993,83,0,0,"Reset Config Failed","dpc-13","IosChanMgr"
0,1012522993,83,1,2,"Point Code Unavailable","dpc-13","IosChanMgr"
0,1012522993,99,0,0,"Reset Config Failed","dpc-14","IosChanMgr"
0,1012522993,123,1,2,"Point Code Unavailable","dpc-14","IosChanMgr"
0,1012522993,139,0,0,"Reset Config Failed","dpc-15","IosChanMgr"
0,1012522993,139,1,2,"Point Code Unavailable","dpc-15","IosChanMgr"
0,1012522993,155,0,0,"Reset Config Failed","dpc-16","IosChanMgr"
0,1012522993,156,1,2,"Point Code Unavailable","dpc-16","IosChanMgr"
```

A comma separates each field. Table A-3 describes the content of each field.

Table A-3 Archived Alarm File Fields

Field Name	Data Type	Maximum Length	Comments
Release level	Integer	3	Format of records (should be set to 0).
Timestamp (seconds)	Integer	10	Indicates the time, in seconds, since the start of the UNIX internal timer, time of epoch.
Timestamp (milliseconds)	Integer	5	Indicates the time, in milliseconds, since the start of the UNIX internal timer, time of epoch.
State	Integer	1	Used for informational alarms, either 0 for reset or 1 for set.
Severity	Integer	1	Indicates the severity of the alarm. There are four severity levels: • 0—Informational • 1—Minor • 2—Major • 3—Critical
Alarm category	String	80	Text that describes the nature of the alarm. For a list and description of the available alarms, see *Cisco PGW 2200 Softswitch Release 9 Messages Reference*.
Component name	String	32	Identifies the component that is associated with the alarm. For more information on components, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.
Originator	String	32	Identifies the service that set or cleared this alarm.

The following sample shows the content of an archived measurement file:

```
0,1012013100,900,0,"messages","SP: cInit out","ss7svc11"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss3-118"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss3-119"
0,1012013100,900,0,"messages","SP: cInit out","ss7svc5"
0,1012013100,900,0,"messages","SP: cInit out","ss7svc8"
0,1012013100,900,0,"messages","SP: cInit out","ss7svc9"
0,1012013100,900,0,"messages","SP: cInit out","ss7svc10"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-2"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","tg-4166"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-3"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","tg-4165"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-4"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-5"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","tg-4164"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","tg-4162"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-6"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","tg-4163"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-7"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-8"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-9"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-10"
0,1012013100,900,0,"occurrances","ACC: CALL REJ","hcss4-11"
```

```
0,1012013100,300,0,"occurrances","ISUP: CHAN MATE UNAVAILABLE","ss7svc4"
```

A comma separates each field. Table A-4 describes the content of each field.

Table A-4 Archived Measurement File Fields

Field Name	Data Type	Maximum Length	Comments
Release level	Integer	3	Format of records (should be set to 0).
Timestamp (seconds)	Integer	10	Indicates the time, in seconds, since the start of the UNIX internal timer, time of epoch.
Time interval (seconds)	Integer	5	Duration of the collection interval.
Measurement value	Integer	10	Value of the measurement.
Measurement units	String	32	The type of measurement unit that is recorded.
Measurement category	String	32	Text that describes the nature of the measurement. For a list and description of the available measurement, see Appendix D, "Cisco PGW 2200 Softswitch Measurements."
Component name	String	32	Identifies the component that is associated with the alarm. For more information on components, see *Cisco PGW 2200 Softswitch Release 9.8 Provisioning Guide*.

APPENDIX B

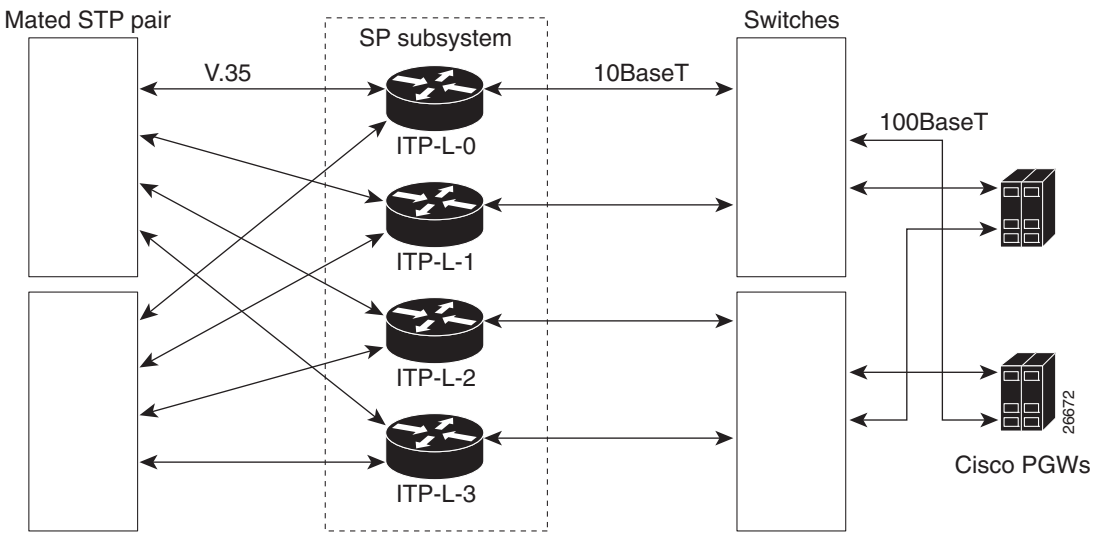
Troubleshooting Cisco ITP-L Signaling

Revised: March 7, 2011, OL-0800-14

Cisco ITP-Ls function as signaling link interfaces to Signaling System 7 (SS7) Signal Transfer Point (STP) mated pairs on the SS7 network side. On the network side, Cisco ITP-Ls function as IP interfaces to the Cisco PGW 2200 Softswitches. Several different SS7 messages pass between the Cisco ITP-Ls and STPs. Messages also pass through Cisco switches between the Cisco ITP-Ls and Cisco PGW 2200 Softswitches.

Each STP in a mated pair is active continuously under normal operating conditions. SS7 message traffic normally flows between both STPs of the mated pair and the Cisco ITP-Ls, as shown in Figure B-1.

Figure B-1 Cisco ITP-L Hardware and I/O Signaling



This chapter includes the following sections:

- Cisco ITP-L Signaling Overview, page B-2
- Troubleshooting SS7 Link Problems, page B-5
- Troubleshooting Cisco ITP-L-to-STP Signaling Links, page B-11
- Troubleshooting Cisco ITP-L to Cisco PGW 2200 Softswitch Communications, page B-14
- Cisco ITP-L Error Messages, page B-17.

Cisco ITP-L Signaling Overview

This section contains the following subsections:

- IP Signaling Backhaul, page B-2
- Connection Management, page B-3

IP Signaling Backhaul

The Cisco PGW 2200 Softswitch and Cisco ITP-L communicate using the Reliable User Datagram Protocol (RUDP) that is proprietary to Cisco to perform IP signaling backhaul.

You can issue the following Cisco ITP-L command line interface (CLI) command to trace backhaul messages:

debug ss7 mtp2 backhaul *channel*

The following sections describe IP signaling backhaul:

- Types of Encapsulation, page B-2
- PDU Verb Types, page B-2
- Backhaul Message IDs, page B-3

Types of Encapsulation

There are two types of data encapsulation that are associated with IP signaling backhaul messages:

- Non-PDU messages—Defined as session manager control messages. These messages serve to control active and standby sessions with the respective Cisco PGW 2200 Softswitches.
- PDU messages—Messages the Session Manager delivers to the Message Transfer Part (MTP) Level 2 (MTP2). These messages serve to control MTP2 and to send and receive message signaling unit (MSU) messages.

PDU Verb Types

There are three PDU verb types that are associated with IP signaling backhaul commands and messages:

- Requests—Messages that are sent only from the Cisco PGW 2200 Softswitch to the Cisco ITP-L. These messages request the Cisco ITP-L to perform some action, such as to connect the link (align link), disconnect the link, or to return its statistics.
- Confirmations—Messages that are sent from the Cisco ITP-L to the Cisco PGW 2200 Softswitch to indicate that a requested action completed successfully or failed.
- Indications—Asynchronous messages that are sent from the Cisco ITP-L to the Cisco PGW 2200 Softswitch to indicate that the Cisco ITP-L detected a state change, such as link alignment lost.

Backhaul Message IDs

There are five types of IP signaling backhaul message IDs:

- Backhaul reset commands
- Connection management commands
- Backhaul statistics messages
- Flow control
- Link status

Backhaul Reset

There are two types of IP signaling backhaul reset commands:

- SoftReset (Link reset)—Command is sent from the Cisco PGW 2200 Softswitch to the Cisco ITP-L to put the backhaul signaling link in the Out-of-Service (OOS) state. If the command succeeds, the Cisco ITP-L does not respond because the backhaul link is out of service. Sample message trace:

  ```
  00:10:18: SoftResetRequest
  ```

- HardReset (CPU reset)—Command is sent from the Cisco PGW 2200 Softswitch to the Cisco ITP-L to cause a CPU reset on the Cisco ITP-L. Sample message trace:

  ```
  00:10:18: HardResetRequest
  ```

Connection Management

There are two IP signaling backhaul connection commands, a connection request and a disconnect request. Each command has a corresponding confirmation message.

- Connection request—Command that is sent from the Cisco PGW 2200 Softswitch to the Cisco ITP-L to request link alignment. The request indicates if the alignment is in a normal or emergency state.
- Connection confirmation—Reply sent by the Cisco ITP-L to the Cisco PGW 2200 Softswitch in response to a connection request. The reply indicates whether the connection request succeeded or failed. Sample message trace:

  ```
  4d10h: MTP2: rcvd Conn Req - Emergency  ch=0 Statistics—
  ```

- Disconnect request—Cisco PGW 2200 Softswitch sends this command to the Cisco ITP-L to change the status of an In-Service (IS) link to the status out of service (OOS). The request is always processed.

  The Cisco ITP-L transmits a status indicator, an Out-of-Service (OOS) message on the SS7 link.
- Disconnect confirmation—Reply sent by the Cisco ITP-L to the Cisco PGW 2200 Softswitch in response to a disconnect request. The reply indicates whether the disconnect request succeeded or failed.
- Disconnect indication—Cisco ITP-L sends this asynchronous message to the Cisco PGW 2200 Softswitch. The message indicates that the Cisco ITP-L detected a state change that calls for a disconnect request command, such as link alignment lost. Sample message trace:

  ```
  4d10h: MTP2: send Disc Ind  ch=0  reason=0x7-LSSU condition
  ```

The following sections describe connection management:

- Backhaul Statistics, page B-4
- Backhaul Congestion, page B-4
- Link Status, page B-5

Backhaul Statistics

There are two IP signaling backhaul statistics messages:

- Stats request—Cisco PGW 2200 Softswitch sends this command that to the Cisco ITP-L to request the Cisco ITP-L to return its MTP Level 1 (MTP1) and MTP2 statistics. The request is always processed.

  The command includes an action value to specify one of three options: (1) return the statistics and reset the statistics collection, (2) return the statistics, or (3) reset the statistics collection.

- Stats confirmation—Reply sent by the Cisco ITP-L to the Cisco PGW 2200 Softswitch in response to the stats request command. Sample message trace:

```
4d10h: MTP2: rcvd Statistics Req-Send&Reset   ch=0
```

Backhaul Congestion

The Cisco ITP-L sends an asynchronous message that includes a congestion indication to the Cisco PGW 2200 Softswitch. The message indicates that the backhaul signaling link is entering (Onset) or exiting (Abate) congestion.

Sample message trace:

```
Mar  1 005616.707 MTP2 send Flow Ind  ch=0  status=0x0 start congestion
```

The Cisco ITP-L has two possible types of congestion. Both are determined in the same manner, but control flow in different directions.

- MTP2 signaling congestion—SS7 congestion that is detected on each SS7 link.
- Backhaul congestion—Pertains to the active Session Manager session.

The percentage of free receive buffers determines the congestion onset and abatement.

- Congestion onset—Indication that the signaling node is congested.

  When the number of free receive buffers drops below 20 percent, the Cisco ITP-L sends a backhaul congestion onset message to the Cisco PGW 2200 Softswitch. At this point, the Cisco PGW 2200 Softswitch holds all backhaul traffic that is destined for the Cisco ITP-L.

- Congestion abate—Indication that congestion has cleared.

  When the number of free receive buffers rises above 40 percent, a backhaul congestion abate message is sent from the Cisco ITP-L to the Cisco PGW 2200 Softswitch. At this point, the Cisco PGW 2200 Softswitch resumes sending backhaul traffic that is destined for the Cisco ITP-L.

Link Status

Congestion status is maintained for backhaul.

Example of a congestion status message:

```
Nomad-C#sho ss7 mtp2 state
SS7 MTP2 states for channel 0
Protocol version for channel 0 is Bellcore GR-246-Core Issue 2, Dec 1997
MTP2LSC_INSERVICE       MTP2IAC_IDLE
MTP2TXC_INSERVICE       MTP2RC_INSERVICE
MTP2SUERM_MONITORING    MTP2AERM_IDLE
MTP2CONGESTION_IDLE
Congestion Backhaul  = Abate
Remote Processor Outage  = FALSE
```

Troubleshooting SS7 Link Problems

The following sections describe methods of troubleshooting SS7 link problems:

- Checking Link Configuration Files, page B-5
- Checking UDP Traffic Flows, page B-6
- Checking Connection between Cisco PGW 2200 Softswitch and Cisco ITP-L, page B-6
- Checking the T1/E1 Link State, page B-6
- Verifying the Link Alignment Status, page B-6
- Verifying Exchanged Point Codes, page B-7
- Cross-Checking Configuration Files, page B-9

Checking Link Configuration Files

Check the configuration files on the Cisco PGW 2200 Softswitch and the Cisco ITP-L. The IP addresses and UPD ports must match.

- MTP2 Configuration:
  - Is the channel configured to the proper MTP2 variant?
  - Do the MTP2 variant protocol parameters match the remote configuration?
- Session Manager Configuration:
  - Are the proper number of sessions defined, session-0 and session-1?
  - Do the session configurations match the Cisco PGW 2200 Softswitch session configurations?
  - Do the RUDP parameters match the Cisco PGW 2200 Softswitch RUDP configuration?

Checking UDP Traffic Flows

Check User Datagram Protocol (UDP) traffic flows between the Cisco PGW 2200 Softswitch and the Cisco ITP-L by entering the following commands:

```
log on 2600, enable
debug ip udp
```

Depending on your configuration, the response should look like the following:

```
2600-1#debug ip udp
UDP packet debugging is on
2600-1#
15:06:53: UDP: rcvd src=10.15.13.6(7000), dst=10.15.13.2(7000), length=32
15:06:53: UDP: rcvd src=10.15.13.6(7000), dst=10.15.13.2(7000), length=32
15:06:53: UDP: sent src=10.15.13.2(7000), dst=10.15.13.6(7000), length=164
15:06:53: UDP: sent src=10.15.13.2(7000), dst=10.15.13.6(7000), length=164
15:06:53: UDP: rcvd src=10.15.13.6(7000), dst=10.15.13.2(7000), length=12
15:06:55: UDP: sent src=10.15.13.2(7000), dst=10.15.13.6(7000), length=32
15:06:55: UDP: rcvd src=10.15.13.6(7000), dst=10.15.13.2(7000), length=12
```

Check for traffic in both directions. If there is traffic, see the "Checking Connection between Cisco PGW 2200 Softswitch and Cisco ITP-L" section on page B-6.

Otherwise, verify IP addresses, try to ping in both directions, reload the Cisco ITP-L software, check subnets, and check the VLANs on the LAN switches.

Checking Connection between Cisco PGW 2200 Softswitch and Cisco ITP-L

Check that the Cisco PGW 2200 Softswitch connects to the Cisco ITP-L:

```
debug ss7 mtp2 backhaul ip upd N
```

Where *N* identifies the specific MTP link. Valid values are from 0 through 3.

The Cisco ITP-L does not attempt to align the link until it receives an MTP3 Connect Indication from the Cisco PGW 2200 Softswitch. Issue the preceding debug command to reveal the MTP3 primitives between the Cisco ITP-L and the Cisco PGW 2200 Softswitch.

Checking the T1/E1 Link State

Check the T1 or E1 link state by observing the LEDs on the Cisco ITP-L. Ensure that the framing options match on both sides of the physical link.

Verifying the Link Alignment Status

Check alignment status of a link by entering the following debug command:

```
debug ss7 mtp2 iac N
```

Where *N* identifies the specific MTP link. Valid values are from 0 through 3.

Table B-1 describes various debug outputs from the previous command, the probable cause, and the recommended recovery. This traffic is exchanged only when the link is initially opened. If the link is already In-Service, nothing is displayed.

Table B-1 Debug Outputs, Probable Causes, and Recovery Actions

Debug Output	Probable Cause	Recovery Action
No output.	Link is already aligned. MTP2 is not started.	1. Check that term monitor is on. 2. Reload Cisco ITP-L. 3. Cross-check configuration files.
15:12:33: itu2IAC_Start chnl=0 MTP2IAC_IDLE 15:12:34: itu2IAC_Stop chnl=0 MTP2IAC_NOT_ALIGNED 15:12:39: itu2IAC_Start chnl=0 MTP2IAC_IDLE 15:12:51: itu2IAC_T2_TMO chnl=0 MTP2IAC_NOT_ALIGNED 15:12:56: itu2IAC_Start chnl=0 MTP2IAC_IDLE 15:13:07: itu2IAC_T2_TMO chnl=0 MTP2IAC_NOT_ALIGNED 15:13:12: itu2IAC_Start chnl=0 MTP2IAC_IDLE	MTP2 does not flow across the link.	Check DS0 assignment (should use the same time slot on both sides of the physical link) and the DS0 speed (defaults to 56 kb/s on T1 and 64 kb/s on E1). The following items can change the DS0 speed: conf t contr E1 0/0 channel-group 0 timeslot 1 speed 56
15:14:32: itu2IAC_Start chnl=0 MTP2IAC_IDLE 15:14:33: itu2IAC_Rcvd_SIE chnl=0 MTP2IAC_NOT_ALIGNED 15:14:33: itu2IAC_Rcvd_SIE chnl=0 MTP2IAC_ALIGNED 15:14:37: itu2IAC_T4_TMO chnl=0 MTP2IAC_PROVING 15:14:38: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0:0, changed state to up 15:14:45: itu2IAC_Rcvd_SIOS chnl=0 MTP2IAC_IDLE 15:14:46: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0:0, changed state to down 15:14:50: itu2IAC_Start chnl=0 MTP2IAC_IDLE 15:14:50: itu2IAC_Rcvd_SIE chnl=0 MTP2IAC_NOT_ALIGNED 15:14:50: itu2IAC_Rcvd_SIE chnl=0 MTP2IAC_ALIGNED 15:14:54: itu2IAC_T4_TMO chnl=0 MTP2IAC_PROVING 15:14:55: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0:0, changed state to up	The link is able to align, but fails in the PROVING sequence. It is generally a mismatch in point codes.	Check the provisioning settings for the SLC, OPC, and DPC in the Cisco PGW 2200 Softswitch, as described in the "Bouncing SS7 Links" section on page 6-101. Use an SS7 sniffer tool to look at the exchanged point codes. The procedure in "Verifying Exchanged Point Codes" section on page B-7 describes how to use the Cisco ITP-L debug tools to see the point codes.

Verifying Exchanged Point Codes

Check exchanged point codes by entering the following command:

```
debug ss7 mtp2 pac N
```

Where *N* identifies the specific MTP link. Valid values are 0 through 3.

Table B-2 describes various debug outputs from this command, the probable cause, and the recommended recovery when the Cisco PGW 2200 Softswitch is using ANSI SS7. Table B-3 describes the debug outputs when the Cisco PGW 2200 Softswitch is using ITU SS7.

Table B-2 Debug Outputs, Probable Causes, and Recovery Actions (ANSI SS7)

Debug Output	Probable Cause	Recovery Action
No output	MTP2 is not started.	1. Check that term monitor is on. 2. Reload the Cisco ITP-L. 3. Cross check configuration files.
15:08:31: MTP2 incoming trace enabled on channel 0. 15:08:31: MTP2 outgoing trace enabled on channel 0. 15:08:34: ---- Outgoing Rudp msg (41 bytes) ---- SM_msg_type 0x00008000 protocol_type 0x0001 msg_ID 0x0000 msg_type 0x0011 channel_ID 0x0000 bearer_ID 0x0000 length 0x0019 data 0xB2236ED6 0x006FD600 0x11F01122 0x33445566 0x778899AA 0xBBCCDDEE 15:08:34: ---- Incoming Rudp msg (41 bytes) ---- SM_msg_type 0x00008000 protocol_type 0x0001 msg_ID 0x0000 msg_type 0x0010 channel_ID 0x0000 bearer_ID 0x0000 length 0x0019 data 0xB2006FD6 0x236ED600 0x21F01122 0x33445566 0x778899AA 0xBBCCDDEE	Cisco PGW 2200 Softswitch is exchanging messages with remote STP. Exchanged point codes must match before communication can be established successfully.	Checkpoint codes: in data 0xB2236ED6 0x006FD6: 1. 236ED6 should be read D6-6E-23 and converted in decimal: 214-110-035, which is the point code of the Cisco PGW 2200 Softswitch. 2. 006FD6 should be read D6-6F-00 and converted in decimal: 214-111-000, which is the point code of the STP in this example. The values in the incoming and outgoing messages must match.

Table B-3 Debug Outputs, Probable Causes, and Recovery Actions (ITU SS7)

Debug Output	Probable Causes	Recovery Action
No output	MTP2 is not started.	1. Check that term monitor is on. 2. Reload the Cisco ITP-L. 3. Cross check configuration files.
Nov 14 15:15:13.276: ---- Outgoing Rudp msg (31 bytes) ---- SM_msg_type 0x00008000 protocol_type 0x0001 msg_ID 0x0000 msg_type 0x0011 channel_ID 0x0000 bearer_ID 0x0000 length 0x000F data 0xC10E0519 0x111180A5 0xA5A5A5A5 0xA5A5A51C Nov 14 15:15:13.288: ---- Incoming Rudp msg (31 bytes) ---- SM_msg_type 0x00008000 protocol_type 0x0001 msg_ID 0x0000 msg_type 0x0010 channel_ID 0x0000 bearer_ID 0x0000 length 0x000F data 0xF1648443 0x112180A5 0xA5A5A5A5 0xA5A5A520	Cisco PGW 2200 Softswitch is exchanging messages with remote STP. Exchanged point codes must match before communication can be established successfully.	Checkpoint codes in the outgoing RUDP message: in data 0x**C10E0519** 0x**11**180A5: The part in bold-face type should be read as 11 19 05 0E C1 and converted in bit-swapped HEX: 0001**000100011001000***0001010000111*011010001. 1. The HEX part in bold-face type is the point code of the Cisco PGW 2200 Softswitch, 0.161.6. 2. The HEX part in italic type is the point code of the STP in this example, 0.140.4. Checkpoint codes in the incoming RUDP message: in data 0x**F1648443** 0x**11**2180A5: The part in bold-face type should be read 11 43 84 64 F1 and converted in bit-swapped HEX: 0001**000101000011100***0001000110010*011110001. 1. The HEX part in bold-face type is the point code of the STP, 0.140.4. 2. The HEX part in italic type is the point code of the Cisco PGW 2200 Softswitch, 0.161.6. The values in the incoming and outgoing messages must match.

Cross-Checking Configuration Files

Cross-check the configuration files by entering the following command:

```
debug ss7 mtp2 iac 0
```

You should see a response like the following Cisco PGW 2200 Softswitch sample configuration file:

```
File: XECfgParm.dat (extract)

*.ipAddrLocalA = 10.15.13.6 # Should be same as *.IP_Addr1
*.ipAddrLocalB = 10.15.13.22
*.ipAddrPeerA = 0.0.0.0 # Failover peer's address
*.ipAddrPeerB = 0.0.0.0

*.IP_Addr1 = 10.15.13.6 # Address of interface on motherboard
*.IP_Addr2 = 10.15.13.22
*.IP_Addr3 = 0.0.0.0
*.IP_Addr4 = 0.0.0.0
*.stPort = 0
```

This file defines the Cisco PGW 2200 Softswitch IP addresses that are used to communicate with the Cisco ITP-L.

To check if they match with the Solaris configuration, issue the Solaris **ifconfig -a** command.

```
File: sigChanDev.dat
001d0001 0 1 00080002 00030014 00060001 0
001d0002 0 1 00080001 00030014 00060001 1
001d0003 1 1 00080001 00030014 00060002 1
001d0004 1 1 00080002 00030014 00060002 0
001d0005 2 1 00080002 00030014 00060001 0
001d0006 2 1 00080001 00030014 00060001 1
001d0007 3 1 00080001 00030014 00060002 1
001d0008 3 1 00080002 00030014 00060002 0
```

Note The last digit in each line (0 or 1 in this example) identifies the link ID on the Cisco ITP-L. The last digit value can be 0, 1, 2, or 3 and is identified, misleadingly, as a time slot in Cisco PGW 2200 Softswitch provisioning. A Cisco ITP-L can only have two STP links.

```
File: sigChanDevIp.dat

001d0001 IP_Addr1 7000 10.15.13.2 7000
001d0002 IP_Addr1 7000 10.15.13.2 7000
001d0003 IP_Addr2 7000 10.15.13.19 7000
001d0004 IP_Addr2 7000 10.15.13.19 7000
001d0005 IP_Addr1 7000 10.15.13.4 7000
001d0006 IP_Addr1 7000 10.15.13.4 7000
001d0007 IP_Addr2 7000 10.15.13.21 7000
001d0008 IP_Addr2 7000 10.15.13.21 7000
```

This file associates the Cisco PGW 2200 Softswitch IP address and UDP port to the Cisco ITP-L IP address and UDP port. IP_Addr1 and IP_Addr2 are defined in XECfgParm.dat.

You should not edit these files using vi. If you use a provisioning tool, any change you make is lost. The only exception is XECfgParm.dat file (and changes can be lost anyway).

Cisco ITP-L sample configuration:

```
controller T1 0/0
framing esf
linecode b8zs
channel-group 0 timeslots 1
!
controller T1 0/1
framing esf
linecode b8zs
channel-group 0 timeslots 1
!
interface Ethernet0/0
ip address 10.15.13.2 255.255.255.240
no ip directed-broadcast
!
interface Serial0/0:0
no ip address
no ip directed-broadcast
!
interface Ethernet0/1
ip address 10.15.13.18 255.255.255.240
no ip directed-broadcast
!
interface Serial0/1:0
no ip address
no ip directed-broadcast
!
```

```
ip classless
ip route 172.18.0.0 255.255.0.0 10.15.13.1
no ip http server
!
ss7 set failover-timer 3
ss7 session-0 address 10.15.13.6 7000 10.15.13.2 7000
ss7 session-0 retrans_t 600
ss7 session-0 cumack_t 300
ss7 session-0 kp_t 2000
ss7 session-0 m_retrans 2
ss7 session-0 m_cumack 3
ss7 session-0 m_outseq 3
ss7 session-0 m_rcvnum 32
!
line con 0
transport input none
line aux 0
line vty 0 4
login
!
end
```

Troubleshooting Cisco ITP-L-to-STP Signaling Links

Cisco ITP-Ls interface with STPs through linksets. STP linksets can support a maximum of 16 individual SS7 signaling links. You can configure each Cisco ITP-L to interface with as many as two individual SS7 signaling links. Cisco ITP-Ls support SS7 Message Transfer Part Levels 1 and 2 (MTP1 and MTP2) in the Cisco ITP-L-to-STP signaling link interfaces.

When you replace a Cisco ITP-L with a new unit, complete the following steps to determine whether the original Cisco ITP-L was the cause of the SS7 communication problem:

Step 1 Connect an SS7 protocol analyzer to a patch panel monitor port to monitor the SS7 message traffic entering or leaving the Cisco ITP-L-to-STP link.

Step 2 Monitor the SS7 message traffic (if any) between the STP and the Cisco ITP-L.

Step 3 If the Cisco ITP-L is receiving SS7 traffic from the STP, go to Step 4.

If the Cisco ITP-L is not receiving SS7 message traffic, go to the "MTP1 Communication Problems" section on page B-12.

Step 4 Ensure that the Cisco ITP-LSS7 is tranceiving Message Signaling Units (MSUs), Fill-in Signaling Units (FISUs), or Link Status Signaling Units (LSSUs).

Step 5 If the Cisco ITP-L is transceiving SS7 LSSU messages, go to the "MTP2 Communication Problems" section on page B-13.

If the Cisco ITP-L is not transceiving SS7 LSSU messages, go to Step 6.

Step 6 If the Cisco ITP-L is transceiving SS7 MSU and FISU messages, go to the "Troubleshooting Cisco ITP-L to Cisco PGW 2200 Softswitch Communications" section on page B-14.

Step 7 If the Cisco ITP-L is not transceiving SS7 MSU and FISU messages, replace the faulty Cisco ITP-L with a backup unit, if one is available.

If the problem is no longer present with the replacement unit, you can test the faulty unit offline to determine the cause of the problem.

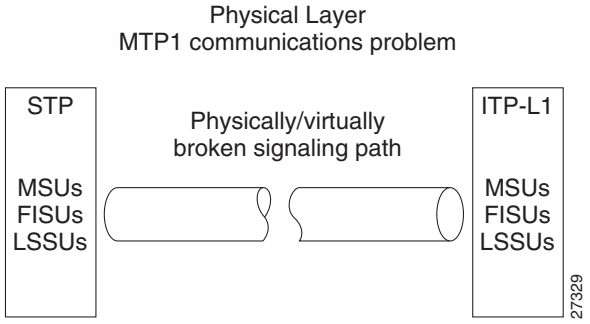
MTP1 Communication Problems

The next two sections describe the procedures for identifying and solving MTP1 communication problems. The initial indication of signaling problems may change in T1 (or E1) status. Check for alarms on the T1 (or E1) interface before performing any of the following procedures.

Identifying MTP1 Communication Problems

MTP1 standardizes SS7 signaling link physical connectivity. When an MTP1 problem occurs, there is a physical connection break or a virtual break (something that causes the symptoms of a physical connection break, such as no power to a card slot) in the signaling link path. A break is identified when no Message Signaling Unit (MSU), Fill-In Signaling Unit (FISU), or Link Status Signaling Unit (LSSU) traffic can be sent or received over the SS7 link. MTP1 communication problems are normally the result of either a hardware failure, a cabling problem, or a physical interface problem.

Figure B-2 Physical Layer, MTP1 Communication Problems



Resolving MTP1 Communication Problems

If monitoring the SS7 link with a protocol analyzer reveals no MSU, FISU, or LSSU message traffic, complete the following steps:

Step 1 Ensure that power is on to the Cisco ITP-L.

Step 2 Check to ensure that the STP signal link cabling is connected correctly to the Cisco ITP-L.

Step 3 Disconnect the Cisco ITP-L from both the STP and the LAN switch for offline testing. Connect two recommended SS7 protocol analyzers, one to the STP interface the other to the IP interface.

One SS7 protocol analyzer must be equipped to send SS7 test messages to (or receive SS7 test messages from) the Cisco ITP-L over the V.35 interface. The other SS7 protocol analyzer sends SS7 test messages to (and receives SS7 test message from) the Cisco ITP-L over the IP interface.

Caution Do not leave the Cisco ITP-L connected to the LAN switch, and thus the Cisco PGW 2200 Softswitch, while injecting SS7 test messages into the Cisco ITP-L. The Cisco PGW 2200 Softswitch might not properly recognize the SS7 test messages that the protocol analyzer sends, which could cause error conditions between the Cisco PGW 2200 Softswitch and the Cisco Media Gateway.

Step 4 Test Cisco ITP-L ports and hardware by conducting a loop test of the signal link, excluding connectivity to the distant-end SS7 node and the LAN switch.

If the test does not discover an MTP1 problem, the MTP1 problem likely resides within the STP node or the connection to the STP node.

Step 5 If the problem is within the Cisco ITP-L, replace the unit.

MTP2 Communication Problems

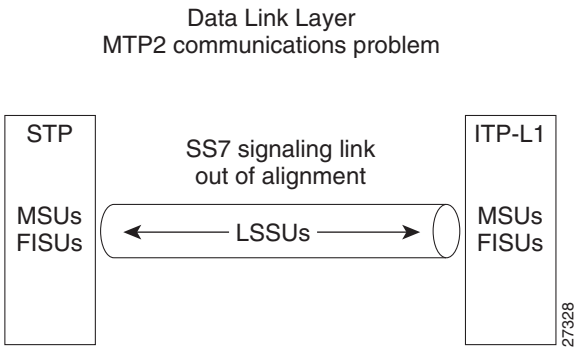
The next two sections describe the procedures for identifying and solving MTP2 communication problems.

Identifying MTP2 Communication Problems

MTP2 standardizes SS7 signaling link alignment. MTP2 communication problems occur when Cisco ITP-Ls cannot establish data link alignment with STPs. When this misalignment occurs, the FISUs and MSUs cease to be transmitted.

Whenever an SS7 link has good physical connectivity (MTP1), but cannot align to send and receive either FISU or MSU traffic, LSSUs replace the FISUs and MSUs.

Figure B-3 Data Link Layer, MTP2 Communication Problem



Resolving MTP2 Communication Problems

If monitoring of the SS7 link with a protocol analyzer reveals no MSU or FISU message traffic (only LSSU traffic), complete the following steps:

Step 1 Check to ensure that the signal link cabling is correctly connected to the Cisco ITP-L.

Step 2 Disconnect the Cisco ITP-L from both the STP and the LAN switch for offline testing. Connect two recommended SS7 protocol analyzers.

One SS7 protocol analyzer must be equipped to send SS7 test messages to (and receive SS7 test messages from) the Cisco ITP-L over the V.35 interface. The other SS7 protocol analyzer sends SS7 test messages to (and receives SS7 messages from) the Cisco ITP-L over the IP interface.

Step 3 Test router ports and hardware by conducting a loop test of the signal link, excluding connectivity to the distant-end SS7 node.

Step 4 If the test does not discover an MTP2 (link alignment) problem, the problem likely resides within the distant end STP node.

If you discover a problem with the Cisco ITP-L, replace the unit.

Troubleshooting Cisco ITP-L to Cisco PGW 2200 Softswitch Communications

Cisco ITP-Ls communicate with a Cisco PGW 2200 Softswitch through a Cisco Catalyst MSR, which serves as a LAN switch. Under normal conditions, all Cisco ITP-Ls actively process SS7 message traffic from the STPs. However, only one of the two Cisco PGW 2200 Softswitches actively processes traffic at a time. One Cisco PGW 2200 Softswitch always stays in a hot-standby mode while the other actively processes message traffic.

Routing, call control, network management, and all other SS7 application data is framed within SS7 protocol layers MTP3 and higher. The Cisco ITP-Ls, which terminate the MTP1 and MTP2 layers, pass MTP3 and higher-layer SS7 protocol data between the Cisco PGW 2200 Softswitches and STP mated pairs.

Cisco ITP-L to Cisco PGW 2200 Softswitch communication comprises multiple Cisco ITP-Ls, which pass SS7 message traffic on to the Cisco PGW 2200 Softswitches through the LAN switches. Each STP linkset coming into a Cisco ITP-L normally has links that are connected to at least two Cisco ITP-Ls to ensure sustained network operation.

The Reliable User Datagram Protocol (RUDP), that is proprietary to Cisco, is used for Cisco ITP-L to Cisco PGW 2200 Softswitch communication. In a fault-tolerant configuration, for example, Ethernet 10BASE-T links connect each Cisco ITP-L to two LAN switches. Ethernet 100BASE-T links connect each LAN switch to both the active Cisco PGW 2200 Softswitch and the standby Cisco PGW 2200 Softswitch.

The following sections describe troubleshooting Cisco PGW 2200 Softswitch and Cisco ITP-L communications:

- Identifying MTP3 and Higher Layer Problems, page B-14
- Identifying Ethernet Connectivity Problems, page B-15
- Identifying IP Communication Problems, page B-16
- Identifying RUDP Communications Problems, page B-16

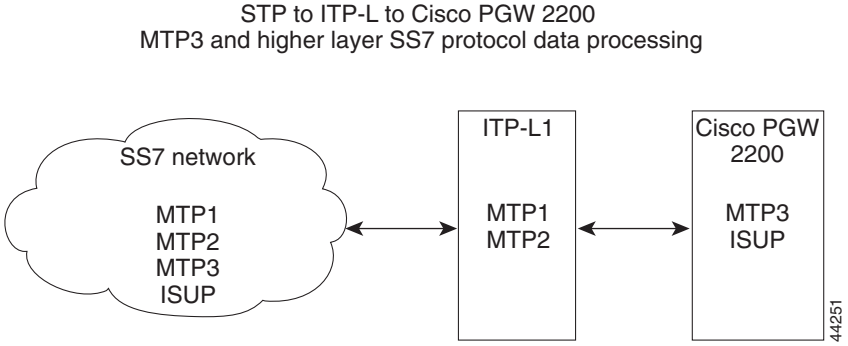
Identifying MTP3 and Higher Layer Problems

Although the Cisco ITP-Ls normally pass MTP3 and higher-layer data directly to the Cisco PGW 2200 Softswitches, Cisco ITP-L hardware can also be the cause of MTP3 and higher layer SS7 communication problems. Cisco ITP-L-originated MTP3 or higher layer SS7 problems can affect message traffic over a certain link, or just the links that transceive through a certain Cisco ITP-L.

Cisco ITP-Ls package received SS7 message data into RUDP datagrams that are transmitted through the LAN switches onto the Cisco PGW 2200 Softswitch. This process is reversed (Cisco ITP-L strips RUDP datagrams) as the Cisco ITP-Ls add standard SS7 message framing when the Cisco PGW 2200 Softswitches send SS7 messages to the Cisco ITP-Ls.

If a tested SS7 link has connectivity (MTP1) and alignment (MTP2), but network management tools report SS7 error messages, there is probably an MTP3 or higher layer SS7 communication problem. This problem requires testing to verify Cisco ITP-L operation.

Figure B-4 MTP3 and Higher-Layer SS7 Protocol Processing



Resolving MTP3 and Higher Layer SS7 Communication Problems

Coordinate a signaling link test of the SS7 transceive path within the system, excluding connectivity to distant end SS7 nodes. Use a recommended SS7 protocol analyzer to send SS7 messages to the suspected Cisco ITP-L while monitoring the output of the Cisco ITP-L with a recommended protocol analyzer. If the test does not discover an MTP1 (connectivity), MTP2 (link alignment), or MTP3 or higher layer problem, the problem probably is not the Cisco ITP-L.

Caution Do not leave the Cisco ITP-L connected to the LAN switch, and thus the Cisco PGW 2200 Softswitch, while injecting SS7 test messages into the Cisco ITP-L. The Cisco PGW 2200 Softswitch might not properly recognize the SS7 test messages that your protocol analyzer generates, which could cause error conditions between the Cisco PGW 2200 Softswitch and the media gateway.

Identifying Ethernet Connectivity Problems

SS7 message components are Ethernet framed and transceived through one of the two Cisco ITP-L Ethernet 10BASE-T ports. A physical break or a virtual break prevents a percentage of messages from traveling along the Cisco PGW 2200 Softswitch path (Cisco ITP-L-to-switch-to-Cisco PGW 2200 Softswitch). Use the ping utility to perform echo response tests. The ping utility should identify Ethernet connectivity problems within these components.

Identifying IP Communication Problems

ITP-L traffic is routed, rerouted, and (if necessary) retransmitted to the Cisco PGW 2200 Softswitches through the LAN switches. Monitor the following Internet Control Message Protocol (ICMP) error-reporting datagrams to help identify IP communication problems:

- Destination Not Reachable/No Echo Reply
- Source Quench/Receiving Buffer Congestion
- Redirection Required
- Time to Live Exceeded
- Parameter Problems
- Timestamp Request/Reply
- Echo Request/Reply

If IP communication is good, the RUDP application layer software could be the cause of the problem. You should be able to use echo and timestamp request messages and monitoring response messages to identify RUDP, IP, or Ethernet communication problems within the system.

Identifying RUDP Communications Problems

You can use the following command to discover a reason for RUDP communication problems:

debug ss7 sm session *ses_num*

Where *ses_num* is the number of the affected session.

The system returns a response like the following:

```
SM: Failed to open session[0], return code = 'x'
```

Where *x* is the RUDP return code. The valid value is an integer from 1 through 14. These return codes are defined as follows:

- 1—RUDP_OPTION_NOT_SUPPORTED
- 2—RUDP_NOT_READY
- 3—RUDP_CONNREC_RESOURCE_UNAV
- 4—RUDP_BUFFER_RESOURCE_UNAVAIL
- 5—RUDP_EVENT_RESOURCE_UNAVAIL
- 6—RUDP_EVENT_ENQUEUE_FAILED
- 7—RUDP_INVALID_CONN_HANDLE
- 8—RUDP_BUFFER_TOO_LARGE
- 9—RUDP_EMPTY_SEND_BUFFER
- 10—RUDP_CONNECTION_NOT_OPEN
- 11—RUDP_SEND_WINDOW_FULL
- 12—RUDP_REMOTE_PORT_REQUIRED
- 13—RUDP_REMOTE_ADDRESS_REQUIRED
- 14—RUDP_LOCAL_PORT_IN_USE

Cisco ITP-L Error Messages

Table B-4 lists the Cisco ITP-L error messages that the Cisco PGW 2200 Softswitch broadcasts.

Table B-4 Cisco ITP-L Error Messages

Message Name	Definition	Recommended Action
`OWNERR, PQUICC, LOG_ERR, MSG_TRACEBACK| MSG_PROCESS`	An internal software error has occurred.	Call your technical support representative for a software upgrade for the Cisco ITP-L.
`INITFAIL, PQUICC, LOG_ALERT, 0, "PQUICC(%d%%d), SCC%d init failed"`	The software failed to initialize and restart a 1T serial card.	Clear the serial interface. If the message recurs, call your technical support representative for assistance.
`CTSLOST, PQUICC, LOG_ALERT, 0, "PQUICC(%d%%d), Clear to Send Lost"`	The CTS[1] input signal on a DTE[2] serial interface became inactive while transmitting a frame. This message results from a communication line failure or cable disconnection.	Check the serial interface cable and communication equipment, such as the CSU/DSU[3].
`UNDERFLO, PQUICC, LOG_ALERT, 0, "PQUICC(%d%%d), Transmit Underflow"`	While transmitting a frame, the local buffer of the serial controller chip received insufficient data. Data could not be transferred to the chip fast enough to keep pace with its output rate. Normally, such a problem is temporary, depending on transient peak loads within the system.	The system should recover; no action is required.
`LINEFLAP, PQUICC, LOG_ALERT, 0, "PQUICC(%d%%d), Excessive modem control changes"`	The system received too many modem control signal interrupts. Modem control signals are hardware handshake signals between data terminal equipment (DTE) and data communications equipment (DCE). The signals include either a data carrier detect (DCD) or a data set ready (DSR), or both.	Check the serial interface cable. The error can occur if the cable is disconnected or has become loose and is picking up noise. If the cable appears to be connected correctly, check the equipment that is connected to the cable.
`BADHDXFSM, PQUICC, LOG_ALERT, 0, "PQUICC(%d%%d), Unexpected HDX state %d, event %d"`	A bad event was detected in the state machine for half duplex transmission/reception.	Copy the error message exactly as it appears, and report it to your Cisco technical support representative.
`TOOSMALL, PQUICC, LOG_ALERT, 0, "PQUICC(%d/%d), packet was less than 2 bytes"`	A small packet (less than 2 bytes) was queued up for transmission. The interface cannot process such small packets for transmission.	The system should recover. No action is required. If the message recurs, it might indicate a hardware error that is related to data traffic patterns. Copy the error message exactly as it appears, and report it to your Cisco technical support representative.

Table B-4 Cisco ITP-L Error Messages (continued)

Message Name	Definition	Recommended Action
TOOBIG, PQUICC, LOG_ALERT, 0, "PQUICC(%d/%d), packet too big";	A packet greater than the assigned MTU of this serial interface was queued for transmission.	The system should recover. No action is required. If the message recurs, it might indicate an error that is related to data traffic patterns. Copy the error message exactly as it appears, and report it to your Cisco technical support representative.
UNKNOWN_WIC, PQUICC, LOG_ALERT, 0,"PQUICC(%d), WIC card has an unknown ID of 0x%x"	The software does not recognize the WAN Interface Card (WIC) that is plugged into the port module.	Check part number on the WIC card to verify that it is supported in the Cisco IOS release operational on the router, or contact your Cisco technical support representative.

1. Clear to Send (CTS)
2. data terminal equipment (DTE)
3. channel service unit/data service unit (CSU/DSU)

If you need to contact your technical support representative for assistance, be prepared to provide the Cisco ITP-L and Cisco PGW 2200 Softswitch debug trace information. You should capture this information while the problem was occurring. In most cases, the backhaul trace and the LSC trace from the Cisco ITP-L are required. If the problem is associated with link alignment, you should also include the IAC trace output. Trace information can help the investigator identify the problem on the Cisco ITP-L or on the Cisco PGW 2200 Softswitch.

To enable MTP2 traces, enter the following commands:

```
debug ss7 mtp2 back channel
debug ss7 mtp2 lsc channel
debug ss7 mtp2 iac channel
```

To turn off debug trace, enter the **un all** command.

The output from a **show version** command provides explicit details about the image and branch information. This information specifically identifies which branch of code to investigate.

The output from a **show run** command indicates which Cisco ITP-L configuration is present. Knowing the configuration is important because improper configurations can cause many problems, such as timer durations.

Provide any information from **show** commands that you used to identify the problem; for example:

```
show ss7 sm stats
```

Include any other information that might be useful for understanding or reproducing the problem. This information helps your technical support representative verify a fix.

APPENDIX C

Troubleshooting Cisco Switch Signaling

Revised: March 7, 2011, OL-0800-14

Deploy two Cisco switches in fault-tolerant, Cisco telephony solutions. Both switches are active. Virtual local-area networks (VLANs) are set up within these switches. System components use these VLANs to route message traffic to other system components.

Normally, at least two Cisco SS7 interfaces are connected to each switch for redundancy. SS7 call messages travel from the interfaces through the VLANs to the Cisco PGW 2200 Softswitches. Use these VLANs to link the Cisco PGW 2200 Softswitches to the media gateways.

This chapter includes the following sections:

- VLANs, page C-1
- Command Line Interface, page C-1
- Troubleshooting Virtual Pathways and ISLs, page C-3

VLANs

Configure VLANs on each switch to simplify management. All intrasystem Ethernet message traffic is partitioned and routed over VLANs according to component origination and destination. The active VLAN configuration is the same as the configuration of the standby VLANs.

Command Line Interface

Access the Command Line Interface (CLI) either locally through a console terminal that is connected to an EIA/TIA-232 port or remotely through a Telnet session. Telnet session access requires a previously set IP address for the switch. Telnet sessions are automatically disconnected after remaining idle for a configurable period.

There are two modes of operation, normal and privileged. Both modes are password protected. Normal-mode commands are used for everyday system monitoring. Privileged commands are used for system configuration and basic troubleshooting.

After you log in successfully, the system automatically enters normal mode, which gives you access to normal-mode commands only. Enter privileged mode by entering the **enable** command that requires a second password. The appearance of the word “enable” indicates privileged mode immediately after the system prompt. To return to normal mode, enter the disable command at the prompt.

Commands that are entered from the CLI can apply to the entire system or to a specific module, port, or VLAN. Modules (module slots), ports, and VLANs are numbered starting with 1.

To reference a specific port on a specific module, the command syntax is mod_num/port_num. For example, 3/1 denotes module 3, port 1. In some commands, such as set trunk, set cam, and set VLAN commands, you can enter lists of ports and VLANs. Designate ports by entering the module and port number. Separate the module and port number pairs with commas. To specify a range of ports, use a dash (-) between the module number and port number pairs. Dashes take precedence over commas.

The following examples show several ways to designate ports:

Example 1: `2/1,2/3 denotes module 2, port 1 and module 2, port 3`
Example 2: `2/1-12 denotes module 2, ports 1 through 12`
Example 3: `2/1-2/12 is the same as Example 2`

A single number designates each VLAN. You specify lists of VLANs in the same way that you do for ports. Separate individual VLANs with commas (,). Separate ranges with dashes (-). The following example specifies VLAN numbers 1 through 10:

```
1-10,1000
```

Some commands require a MAC address, IP address, or IP alias, which must be designated in a standard format. The MAC address format must be six hyphen-separated hexadecimal numbers, as shown in the following example:

```
00-00-0c-24-d2-fe
```

The IP address format is 32 bits, written as four octets, which are separated by periods (dotted decimal format). The address includes a network section, an optional subnet section, and a host section, as shown in the following example:

```
126.2.54.1
```

If the IP alias table is configured, you can use IP aliases in place of the dotted decimal IP address. This option is available for most commands that use an IP address, except commands that define the IP address or IP alias. For more information about the set interface and set IP alias commands, see the command reference for your switch.

Command Line Interface Local Access

To obtain local access to the CLI, complete the following steps:

Step 1 At the Console> prompt, press **Return** (or **Enter**).

Step 2 At the Enter Password: prompt, enter the system password. The Console> prompt indicates that you have successfully accessed the CLI in normal operation mode.

Step 3 Enter the necessary commands to complete the required task.

Step 4 Enter **quit** and press **Return** (or **Enter**) to exit the session.

Command Line Interface Remote Access

To get remote access to the CLI, complete the following steps:

Step 1 From the remote host, enter the Telnet command and designate the name or IP address of the switch you wish to access (Telnet hostname | IP address).

Step 2 At the Enter Password: prompt, enter the password for the CLI. There is no default password (press **Return** or **Enter**) unless a password was previously established using the set password command.

Step 3 Enter the necessary commands to complete the required task.

Step 4 Enter quit and press **Return** (or **Enter**) to exit the Telnet session.

Troubleshooting Virtual Pathways and ISLs

Use a recommended protocol analyzer (locally or remotely) equipped with a **ping** utility to perform Ethernet echo response tests to identify switch hardware, VLAN, and ISL connectivity problems. Use echo to see if another host is active on the network. The ping sender initializes the identifier and sequence number, which is used if multiple echo requests are sent. The ping sender adds some data to the data field, and sends the ICMP echo to the destination host. The ICMP header code field is zero. The recipient changes the type to Echo Reply and returns the datagram to the sender. Use this mechanism to determine if a destination host is reachable.

To use the **ping** command, complete the following steps:

Step 1 Log in to the CLI and enter the command:

```
Console> show port status
```

The command displays a response like the following:

```
Port  Name               Status     Vlan       Level  Duplex Speed Type
----- ------------------ ---------- ---------- ------ ------ ----- ------------
 1/1                     connected  523        normal   half   100 100BaseTX
 1/2                     notconnect 1          normal   half   100 100BaseTX
 2/1                     connected  trunk      normal   half   400 Route Switch
 3/1                     notconnect trunk      normal   full   155 OC3 MMF ATM
 5/1                     notconnect 1          normal   half   100 FDDI
 5/2                     notconnect 1          normal   half   100 FDDI
```

Step 2 Enter the CLI command **show vlan**.

```
Console> (enable) show vlan 998
```

The command displays a response like the following:

```
VLAN Name                             Status    IfIndex Mod/Ports, Vlans
---- -------------------------------- --------- ------- -------------------------
998  VLAN0998                         active    357


VLAN Type  SAID       MTU   Parent RingNo BrdgNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ ------ ---- -------- ------ ------
998  trcrf 100998     4472  999    0xff   -      -    srb      0      0
```

```
VLAN AREHops STEHops Backup CRF
---- ------- ------- ----------
998  10      10      off
```

Step 3 Enter (for ISLs) the command **show trunk**.

```
Console> (enable) show trunk
```

The command displays a response like the following:

```
Port      Mode         Encapsulation  Status        Native vlan
--------  -----------  -------------  ------------  -----------
 2/1      desirable    dot1q          trunking      1
 2/2      desirable    dot1q          trunking      1

Port      Vlans allowed on trunk
--------  ----------------------------------------------------
 2/1      1-1005
 2/2      1-1005

Port      Vlans allowed and active in management domain
--------  ----------------------------------------------------
 2/1      1,10,20,30,40,50,60
 2/2      1,10,20,30,40,50,60

Port      Vlans in spanning tree forwarding state and not pruned
--------  ----------------------------------------------------
 2/1      1,10,20,30,40,50,60
 2/2      1,10,20,30,40,50,60
```

Step 4 Use a **ping** utility to test the desired ports, VLANs, and ISLs.

Step 5 Check the switch equipment status, as described in the associated documentation. Replace suspected hardware, and then return to Step 1 to verify switch operation.

APPENDIX D

Cisco PGW 2200 Softswitch Measurements

Revised: March 7, 2011, OL-0800-14

This appendix lists the ITU and ANSI measurements that the Cisco PGW 2200 Softswitch can produce.

Table D-1 lists the ITU measurements. The logging intervals in this table are all measured in minutes, except for an interval of 24. A logging interval of 24 indicates a 24-hour time period.

Table D-2 lists the ANSI ISDN User Part (ISUP) measurements.

You can access the Management Information Base (MIB) for the measurements in *Cisco PGW 2200 Softswitch Release 9 Management Information Base Guide*.

Table D-1 Operational Measurements Supported

MML Counter Group:Name	Description	Related Components	Logging Interval
ACC-GROUP	Automatic congestion control (ACC) statistics	SS7 Signaling Service	
ACC: CALL REJ	Number of calls that ACC rejected		15, 60, 24
ACC: CALL RE-RTE	Number of calls that ACC rerouted	Trunk Groups: ISUP IPFAS MGCP NAS	15, 60, 24
ALL-COUNTERS	Lists all of the measurements	n/a	n/a
ASP-GROUP	Auxiliary signal path statistics	Auxiliary Signaling Service	
CALL-GROUP	Calling statistics	Cisco PGW 2200 Softswitch Network Element	
CALL: ACC REJ TOT	Number of calls that ACC rejected		15, 60, 24
CALL: ACC RE-RTE TOT	Number of calls that ACC rerouted		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
CALL-GROUP (continued)	Calling statistics	Cisco PGW 2200 Softswitch Network Element	
CALL: CallBackCallSetup	Added in Release 9.7. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back Call set up request from DPNSS, QSIG, or EISUP (with tunneled QSIG) interfaces.		15, 60, 24
CALL: CallBackFreeNotification	Added in Release 9.7. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back Line Free Notification from DPNSS, QSIG, or Tunneled QSIG interfaces.		15, 60, 24
CALL: CTICBCancel	Added in Release 9.6. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back request cancellation from DPNSS or the Cisco CallManager.		15, 60, 24
CALL: CTICBCancel	Added in Release 9.7. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back Cancellation from DPNSS, QSIG, or Tunneled QSIG interfaces.		15, 60, 24
CALL: CTICBReq	Added in Release 9.6. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back request from DPNSS or the Cisco CallManager.		15, 60, 24
CALL: CTICBReq	Added in Release 9.7. This counter increments each time the Cisco PGW 2200 Softswitch receives a Call Back request from DPNSS, QSIG, or Tunneled QSIG interfaces.		15, 60, 24
CALL: FailCall TOT	Number of failed calls		15, 60, 24
CALL: H323LicRej TOT	Added in Release 9.7. H.323 call is rejected because of run-time license management. This counter is incremented each time the Cisco PGW 2200 Softswitch rejects an originating or terminating H.323 call leg because of run-time license management.		15, 60, 1440
CALL: IncT38FaxReq	Number of times a T.38 fax tone is detected on incoming calls		15, 60, 24
CALL: IncT38FaxUsed	Number of times a T.38 fax is successfully completed on incoming calls		15, 60, 24
CALL: InvalidMsgDestination	Added in Release 9.6. This counter is incremented each time that an internal message cannot be delivered because the destination call reference does not exist (or no longer exists).		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
CALL-GROUP (continued)	Calling statistics	Cisco PGW 2200 Softswitch Network Element	
CALL: MessageWaitingIndication	Added in Release 9.7. This counter increments each time the Cisco PGW 2200 Softswitch receives a Message Waiting Indication over DPNSS, QSIG, Tunneled QSIG, or SIP.		15, 60, 24
CALL: OLFailCall TOT	Number of calls that failed because of overload		15, 60, 24
CALL: OtgT38FaxReq	Number of times a T.38 fax tone is detected on outgoing calls		15, 60, 24
CALL: OtgT38FaxUsed	Number of times a T.38 fax completes successfully on outgoing calls		15, 60, 24
CALL: ORFailCall TOT	Number of calls that failed due to other reasons		15, 60, 24
CALL: PrepaidAccess	Number of times the Prepaid Calling Card IN service is invoked		15, 60, 24
CALL: PrepaidComplet	Number of times a Prepaid Calling Card call reaches the connected state		15, 60, 24
CALL: RLFailCall TOT	Number of times a call failed due to the route list being exhausted		15, 60, 24
CALL: RoCompleted	Added in Release 9.6. This counter is incremented each time the RO feature runs and concludes successfully.		15, 60, 24
CALL: RoDenialsReceived	Added in Release 9.6. This counter is incremented each time an RO rejection (refusal) is received over the DPNSS interface.		15, 60, 24
CALL: RoDenialsSent	Added in Release 9.6. This counter is incremented each time the Cisco PGW 2200 Softswitch refuses the RO invocation request that is sent over the DPNSS interface.		15, 60, 24
CALL: RoInvokesReceived	Added in Release 9.6. This counter is incremented each time an RO invocation request is received over the DPNSS interface at a point of interworking.		15, 60, 24
CALL: RoInvokesSent	Added in Release 9.6. This counter is incremented each time an RO invocation request is generated internally and sent over the DPNSS interface.		15, 60, 24
CALL: RUFailCall TOT	Number of calls that failed due to a resource being unavailable		15, 60, 24
CALL: SIPLicRej TOT	Added in Release 9.7. SIP call is rejected due to run-time license management. This counter is incremented each time the Cisco PGW 2200 Softswitch rejects an originating or terminating SIP call leg due to run-time license management.		15, 60, 1440

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
CALL-GROUP (continued)	Calling statistics	Cisco PGW 2200 Softswitch Network Element	
CALL: SuccRedirected	Number of successful redirected calls that the Cisco PGW 2200 Softswitch initiated		15, 60, 24
CALL: SuccCall TOT	Number of successful calls		15, 60, 24
CALL: TDMLicRej TOT	Added in Release 9.7. TDM call is rejected due to run-time license management. This counter is incremented each time the Cisco PGW 2200 Softswitch rejects an originating or terminating TDM call leg due to run-time license management.		15, 60, 1440
CALL: TimesTenLicRej TOT	Added in Release 9.8. TimesTen call is rejected due to a TimesTen license violation. This counter is incremented each time the Cisco PGW 2200 Softswitch rejects a call due to run-time database license management.		15, 60, 1440
CAS-GROUP	CAS traffic statistics	CAS Signaling Service	
CAS: IN CALL ATMPT TOT	Number of incoming call attempts		15, 60, 24
CAS: IN CALL SUCC TOT	Number of successful incoming calls		15, 60, 24
CAS: IN SZR ATMPT TOT	Number of incoming seizure attempts		15, 60, 24
CAS: OUT CALL ATMPT TOT	Number of outgoing call attempts		15, 60, 24
CAS: OUT CALL SUCC TOT	Number of successful outgoing calls		15, 60, 24
CAS: IN SZR SUCC TOT	Number of successful incoming seizures		15, 60, 24
CAS: IN UNEXPECTED MSG	Number of incoming unexpected messages		15, 60, 24
CAS: OUT SZR ATMPT TOT	Number of outgoing seizure attempts		15, 60, 24
CAS: OUT SZR SUCC TOT	Number of successful outgoing seizures		15, 60, 24
C7LNK-GROUP	SS7 link statistics	SS7 Link	
C7LNK: RCV SU ERR	Number of signaling units received		30
C7LNK: XMIT SIO TOT	Number of link realignment (SIF/SIO) messages transmitted		30
C7LNK: RCV SIO TOT	Number of link realignment (SIF/SIO) messages received		30
C7LNK: DUR IS	Number of seconds that the C7 link is in-service		30
C7LNK: DUR UNAVAIL	Number of seconds that the C7 link is unavailable		30
C7LNK: MSU DROP-CONG	Number of messages dropped due to congestion		30
C7SP-GROUP	SS7 Signaling path statistics	SS7 Signaling Service SS7 Subsystem	
C7SP: SP DUR UNAVAIL	Number of seconds that the SP is unavailable		5, 30
C7SP: XMIT MSU DROP/RTE	Number of transmitted messages dropped due to routing failure		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
ISUP-GROUP	ISUP Signaling Service Statistics	SS7 Point Code or SS7 Signaling Service	
ISUP: ABN REL TOT	Number of abnormal clear messages received		5, 30
ISUP: AOC TOT	Number of calls that invoked the advice of charge (AOC) feature		5, 30
ISUP: CHAN MATE UNAVAILABLE	Number of Channel Mate Unavailable messages received		5, 30
ISUP: FAIL_H323_ORIG	Number of failed calls that originated in an H.323 network		15, 60, 24
ISUP: FAIL_H323_TERM	Number of failed calls that terminated in an H.323 network		15, 60, 24
ISUP: RCV ACM TOT	Number of ACM messages received		5, 30
ISUP: RCV ANM TOT	Number of ANM messages received		5, 30
ISUP: RCV BELGACOM1 TOT	Number of BELGACOM1 messages received		5, 30
ISUP: RCV BELGACOM2 TOT	Number of BELGACOM2 messages received		5, 30
ISUP: RCV BLA TOT	Number of BLA messages received		5, 30
ISUP: RCV BLO TOT	Number of BLO messages received		5, 30
ISUP: RCV CCR TOT	Number of CCR messages received		5, 30
ISUP: RCV CFN TOT	Number of CFN messages received		5, 30
ISUP: RCV CGBA TOT	Number of CGBA messages received		5, 30
ISUP: RCV CGB TOT	Number of CGB messages received		5, 30
ISUP: RCV CGUA TOT	Number of CGUA messages received		5, 30
ISUP: RCV CGU TOT	Number of CGU messages received		5, 30
ISUP: RCV CHG TOT	Number of CHG messages received		5, 30
ISUP: RCV CON TOT	Number of CON messages received		5, 30
ISUP: RCV COT TOT	Number of COT messages received		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
ISUP-GROUP (continued)	ISUP Signaling Service Statistics	SS7 Point Code or SS7 Signaling Service	
ISUP: RCV CPG TOT	Number of CPG messages received		5, 30
ISUP: RCV CQM TOT	Number of CQM messages received		5, 30
ISUP: RCV CQR TOT	Number of CQR messages received		5, 30
ISUP: RCV CRA TOT	Number of CRA messages received		5, 30
ISUP: RCV CRM TOT	Number of CRM messages received		5, 30
ISUP: RCV CVR TOT	Number of CVR messages received		5, 30
ISUP: RCV CVT TOT	Number of CVT messages received		5, 30
ISUP: RCV EOH TOT	Number of EOH messages received		5, 30
ISUP: RCV EOHA TOT	Number of EOHA messages received		5, 30
ISUP: RCV EXM TOT	Number of EXM messages received		5, 30
ISUP: RCV FAA TOT	Number of FAA messages received		5, 30
ISUP: RCV FAC TOT	Number of FAC messages received		5, 30
ISUP: RCV FAD TOT	Number of FAD messages received		5, 30
ISUP: RCV FAR TOT	Number of FAR messages received		5, 30
ISUP: RCV FOT TOT	Number of FOT messages received		5, 30
ISUP: RCV FRJ TOT	Number of FRJ messages received		5, 30
ISUP: RCV FWT TOT	Number of FWT messages received		5, 30
ISUP: RCV GRA TOT	Number of GRA messages received		5, 30
ISUP: RCV GRS TOT	Number of GRS messages received		5, 30
ISUP: RCV IAM TOT	Number of IAM messages received		5, 30
ISUP: RCV IDR TOT	Number of IDR messages received		5, 30
ISUP: RCV INF TOT	Number of INF messages received		5, 30
ISUP: RCV INR TOT	Number of INR messages received		5, 30
ISUP: RCV IRS TOT	Number of IRS messages received		5, 30
ISUP: RCV LPA TOT	Number of LPA messages received		5, 30
ISUP: RCV LPM TOT	Number of LPM messages received		5, 30
ISUP: RCV MCID TOT	Number of MCID messages received		5, 30
ISUP: RCV MPM TOT	Number of MPM messages received		5, 30
ISUP: RCV MSG TOT	Total number of messages that are received		5, 30
ISUP: RCV NRM TOT	Number of NRM messages received		5, 30
ISUP: RCV OPR TOT	Number of OPR messages received		5, 30
ISUP: RCV PAM TOT	Number of PAM messages received		5, 30
ISUP: RCV PRI TOT	Number of PRI messages received		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
ISUP-GROUP (continued)	ISUP Signaling Service Statistics	SS7 Point Code or SS7 Signaling Service	
ISUP: RCV REL TOT	Number of REL messages received		5, 30
ISUP: RCV RES TOT	Number of RES messages received		5, 30
ISUP: RCV RLC TOT	Number of RLC messages received		5, 30
ISUP: RCV RSC TOT	Number of RSC messages received		5, 30
ISUP: RCV SAM TOT	Number of SAM messages received		5, 30
ISUP: RCV SGM TOT	Number of SGM messages received		5, 30
ISUP: RCV SUS TOT	Number of SUS messages received		5, 30
ISUP: RCV UBA TOT	Number of UBA messages received		5, 30
ISUP: RCV UBL TOT	Number of UBL messages received		5, 30
ISUP: RCV UCIC TOT	Number of UCIC messages received		5, 30
ISUP: RCV UPA TOT	Number of UPA messages received		5, 30
ISUP: RCV UPT TOT	Number of UPT messages received		5, 30
ISUP: RCV USR TOT	Number of USR messages received		5, 30
ISUP: SUCC_H323_ORIG	Number of successful calls that originated in an H.323 network		15, 60, 24
ISUP: SUCC_H323_TERM	Number of successful calls that terminated in an H.323 network		15, 60, 24
ISUP: UNEX MSG TOT	Number of unexpected messages received		5, 30
ISUP: UNREC MSG TOT	Number of unrecognized messages received		5, 30
ISUP: XMIT ACM TOT	Number of ACM messages transmitted		5, 30
ISUP: XMIT ANM TOT	Number of ANM messages transmitted		5, 30
ISUP: XMIT BELGACOM1 TOT	Number of BELGACOM1 messages transmitted		5, 30
ISUP: XMIT BELGACOM2 TOT	Number of BELGACOM2 messages transmitted		5, 30
ISUP: XMIT BLA TOT	Number of BLA messages transmitted		5, 30
ISUP: XMIT BLO TOT	Number of BLO messages transmitted		5, 30
ISUP: XMIT CCR TOT	Number of CCR messages transmitted		5, 30
ISUP: XMIT CFN TOT	Number of CFN messages transmitted		5, 30
ISUP: XMIT CGBA TOT	Number of CGBA messages transmitted		5, 30
ISUP: XMIT CGB TOT	Number of CGB messages transmitted		5, 30
ISUP: XMIT CGUA TOT	Number of CGUA messages transmitted		5, 30
ISUP: XMIT CGU TOT	Number of CGU messages transmitted		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
ISUP-GROUP (continued)	ISUP Signaling Service Statistics (continued)	SS7 Point Code or SS7 Signaling Service	
ISUP: XMIT CHG TOT	Number of CHG messages transmitted		5, 30
ISUP: XMIT CON TOT	Number of CON messages transmitted		5, 30
ISUP: XMIT COT TOT	Number of COT messages transmitted		5, 30
ISUP: XMIT CPG TOT	Number of CPG messages transmitted		5, 30
ISUP: XMIT CQM TOT	Number of CQM messages transmitted		5, 30
ISUP: XMIT CQR TOT	Number of CQR messages transmitted		5, 30
ISUP: XMIT CRA TOT	Number of CRA messages transmitted		5, 30
ISUP: XMIT CRM TOT	Number of CRM messages transmitted		5, 30
ISUP: XMIT CVR TOT	Number of CVR messages transmitted		5, 30
ISUP: XMIT CVT TOT	Number of CVT messages transmitted		5, 30
ISUP: XMIT EOHA TOT	Number of EOHA messages transmitted		5, 30
ISUP: XMIT EOH TOT	Number of EOH messages transmitted		5, 30
ISUP: XMIT EXM TOT	Number of EXM messages transmitted		5, 30
ISUP: XMIT FAA TOT	Number of FAA messages transmitted		5, 30
ISUP: XMIT FAC TOT	Number of FAC messages transmitted		5, 30
ISUP: XMIT FAD TOT	Number of FAD messages transmitted		5, 30
ISUP: XMIT FAR TOT	Number of FAR messages transmitted		5, 30
ISUP: XMIT FOT TOT	Number of FOT messages transmitted		5, 30
ISUP: XMIT FRJ TOT	Number of FRJ messages transmitted		5, 30
ISUP: XMIT FWT TOT	Number of FWT messages transmitted		5, 30
ISUP: XMIT GRA TOT	Number of GRA messages transmitted		5, 30
ISUP: XMIT GRS TOT	Number of GRS messages transmitted		5, 30
ISUP: XMIT IAM TOT	Number of IAM messages transmitted		5, 30
ISUP: XMIT IDR TOT	Number of IDR messages transmitted		5, 30
ISUP: XMIT INF TOT	Number of INF messages transmitted		5, 30
ISUP: XMIT INR TOT	Number of INR messages transmitted		5, 30
ISUP: XMIT LPA TOT	Number of LPA messages transmitted		5, 30
ISUP: XMIT LPM TOT	Number of LPM messages transmitted		5, 30
ISUP: XMIT IRS TOT	Number of IRS messages transmitted		5, 30
ISUP: XMIT MCID TOT	Number of MCID messages transmitted		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
ISUP-GROUP (continued)	ISUP Signaling Service Statistics (continued)	SS7 Point Code or SS7 Signaling Service	
ISUP: XMIT MPM TOT	Number of MPM messages transmitted		5, 30
ISUP: XMIT MSG TOT	Total number of messages that are transmitted		5, 30
ISUP: XMIT NRM TOT	Number of NRM messages transmitted		5, 30
ISUP: XMIT OPR TOT	Number of OPR messages transmitted		5, 30
ISUP: XMIT PAM TOT	Number of PAM messages transmitted		5, 30
ISUP: XMIT PRI TOT	Number of PRI messages transmitted		5, 30
ISUP: XMIT REL TOT	Number of REL messages transmitted		5, 30
ISUP: XMIT RES TOT	Number of RES messages transmitted		5, 30
ISUP: XMIT RLC TOT	Number of RLC messages transmitted		5, 30
ISUP: XMIT RSC TOT	Number of RSC messages transmitted		5, 30
ISUP: XMIT SAM TOT	Number of SAM messages transmitted		5, 30
ISUP: XMIT SGM TOT	Number of SGM messages transmitted		5, 30
ISUP: XMIT SUS TOT	Number of SUS messages transmitted		5, 30
ISUP: XMIT UBA TOT	Number of UBA messages transmitted		5, 30
ISUP: XMIT UBL TOT	Number of UBL messages transmitted		5, 30
ISUP: XMIT UCIC TOT	Number of UCIC messages transmitted		5, 30
ISUP: XMIT UPA TOT	Number of UPA messages sent		5, 30
ISUP: XMIT UPT TOT	Number of UPT messages sent		5, 30
ISUP: XMIT USR TOT	Number of USR messages transmitted		5, 30
IUA GROUP	IUA message statistics	Association	
IUA: ASPActAckRx	Added in Release 9.6. Number of ASP Active Acknowledgement messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association.		15, 60, 24
IUA: ASPActTx	Added in Release 9.6. Number of ASP Active messages that the Cisco PGW 2200 Softswitch sent to the media gateway on this SCTP association. These messages indicate that the Cisco PGW 2200 Softswitch is active.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
IUA GROUP (continued)	IUA message statistics	Association	
IUA: ASPDnAckRx	Added in Release 9.6. Number of ASP Up Acknowledgement messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association.		15, 60, 24
IUA: ASPDnTx	Added in Release 9.6. Number of ASP Down messages that the Cisco PGW 2200 Softswitch sent to the media gateway on this SCTP association. These messages indicate that the Cisco PGW 2200 Softswitch is *not* ready to receive traffic or maintenance messages.		15, 60, 24
IUA: ASPInactTx	Added in Release 9.6. Number of ASP Inactive messages that the Cisco PGW 2200 Softswitch sent to the media gateway on this SCTP association. These messages indicate that the Cisco PGW 2200 Softswitch is inactive.		15, 60, 24
IUA: ASPInactAckRx	Added in Release 9.6. Number of ASP Inactive Acknowledgement messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association.		15, 60, 24
IUA: ASPUpAckRx	Added in Release 9.6. Number of ASP Up Acknowledgement messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association.		15, 60, 24
IUA: ASPUpTx	Added in Release 9.6. Number of application server process (ASP) Up messages that the Cisco PGW 2200 Softswitch sent to the media gateway on this SCTP association. These messages indicate that the Cisco PGW 2200 Softswitch is ready to receive traffic or maintenance messages.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
IUA: DataRqt	Added in Release 9.6. Number of Data messages that the Cisco PGW 2200 Softswitch sent to the media gateway on this SCTP association. Each message is transmitted by using the Q.921 acknowledged information transfer service.		15, 60, 24
IUA: DataInd	Added in Release 9.6. Number of Data messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association. Each message is received by using the Q.921 acknowledged information transfer service.		15, 60, 24
IUA: ErrorRx	Added in Release 9.6. Number of Error messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association.		15, 60, 24
IUA GROUP (continued)	IUA message statistics	Association	
IUA: EstRqt	Added in Release 9.6. Number of requests that an SCTP association established.		15, 60, 24
IUA: EstConf	Added in Release 9.6. Number of confirmations that IUA has established an SCTP association with the media gateway.		15, 60, 24
IUA: EstInd	Added in Release 9.6. Number of times that the media gateway has informed Link Management that the Cisco PGW 2200 Softswitch has established an SCTP association.		15, 60, 24
IUA: NotifyRx	Added in Release 9.6. Number of Notify messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association. These messages provide autonomous indications of IUA events on the media gateway.		15, 60, 24
IUA: RelConf	Added in Release 9.6. Number of confirmations that IUA has released an SCTP association with the media gateway.		15, 60, 24
IUA: RelInd	Added in Release 9.6. Number of times that the media gateway has informed Link Management that the Cisco PGW 2200 Softswitch has released an SCTP association.		15, 60, 24
IUA: RelRqt	Added in Release 9.6. Number of requests for the release of an SCTP association with a media gateway.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
IUA: UnitDataInd	Added in Release 9.6. Number of Data messages that the Cisco PGW 2200 Softswitch received from the media gateway on this SCTP association. Each message is received through the user of the Q.21 unacknowledged information transfer service.		15, 60, 24
IUA: UnitDataRqt	Added in Release 9.6. Number of Data messages that are sent from the Cisco PGW 2200 Softswitch to the media gateway on this SCTP association. Each message is transmitted by using the Q.21 unacknowledged information transfer service.		15, 60, 24
LABEL GROUP	Label message statistics.	Label	
LABEL: LabelRej TOT	Added in Release 9.6. The number of calls (that is, occurrences) that were rejected, which pertain to this call limiting location label.		15, 60, 24
LABEL: LabelSucc TOT	Added in Release 9.6. The number of successful calls, that is, occurrences, that pertain to this call limiting location label.		15, 60, 24
M3UA GROUP	M3UA message statistics	Association	
M3UA: DaudTx	Number of DAUD messages transmitted		15, 60, 24
M3UA: DavaRx	Number of DAVA messages received		15, 60, 24
M3UA: DrstRx	Number of DRST messages received		15, 60, 24
M3UA: DunaRx	Number of DUNA messages received		15, 60, 24
M3UA: DupuRx	Number of DUPU messages transmitted		15, 60, 24
M3UA: ErrorTx	Number of error messages transmitted.		15, 60, 24
M3UA: ErrorRx	Number of error messages received		15, 60, 24
M3UA: NotifyTx	Number of notify messages transmitted		15, 60, 24
M3UA: NotifyRx	Number of notify messages received		15, 60, 24
M3UA: SconRx	Number of SCON messages received		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
M3UA GROUP (continued)	M3UA message statistics	Association	
M3UA: AspActAckRx	Number of ASP ACTIVE ACK messages received		15, 60, 24
M3UA: ASPActTx	Number of ASP ACTIVE messages transmitted		15, 60, 24
M3UA: ASPDnAckRx	Number of ASP DOWN acknowledge messages received		15, 60, 24
M3UA: ASPDnTx	Number of ASP DOWN messages transmitted		15, 60, 24
M3UA: AspInactAckRx	Number of ASP INACTIVE ACK messages received		15, 60, 24
M3UA: ASPInactTx	Number of ASP INACTIVE messages transmitted		15, 60, 24
M3UA: ASPUpAckRx	Number of ASP UP acknowledgments received		15, 60, 24
M3UA: ASPUpTx	Number of ASP UP messages transmitted		15, 60, 24
M3UA: AssocFail	Number of SCTP association failures		15, 60, 24
M3UA: AssocTxFail	Number of transmit SCTP failures		15, 60, 24
M3UA GROUP (continued)	M3UA message statistics	Association	
M3UA: DataBytesRx	Number of M3UA data bytes received		15, 60, 24
M3UA: DataBytesTx	Number of M3UA data bytes transmitted		15, 60, 24
M3UA: DataXferRx	Number of data transfer messages received		15, 60, 24
M3UA: DataXferTx	Number of data transfer messages transmitted		15, 60, 24
M3UA: InvSctpSig	Number of invalid SCTP signals that M3UA received		15, 60, 24
M3UA: RouteCntxErr	Number of messages that were received with an invalid (unconfigured) Routing Context.		15, 60, 24
M3UA: RxMsgClassErr	Number of received messages with an unexpected or unsupported Message Class		15, 60, 24
M3UA: RxMsgLenErr	Number of messages that were received with length error		15, 60, 24
M3UA: RxMsgTypeErr	Number of messages that were received with an unexpected or unsupported Message Type		15, 60, 24
M3UA: RxNoMemErr	Number of messages that were dumped because memory ran out (buffer overflow).		15, 60, 24
M3UA: RxNtwkAppErr	Number of messages that were received with an invalid (unconfigured) Network Appearance.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
M3UA: RxProtErr	Number of messages that are received with protocol errors, for any protocol anomaly (that is, reception of a parameter that is syntactically correct but unexpected in the current state).		15, 60, 24
M3UA: RxParmFieldErr	Number of messages that are received with a parameter having a wrong length field.		15, 60, 24
M3UA: RxParmValErr	Number of messages that are received with parameter value errors.		15, 60, 24
M3UA: RxStrmIdErr	Number of messages that are received with stream ID error. This error occurs when a message is received on an unexpected SCTP stream (for example, a Management message was received on a stream other than "0").		15, 60, 24
M3UA: RxUnexpParmErr	Number of messages received that contain one or more invalid parameters.		15, 60, 24
M3UA: RxUnexpMsgErr	Number of unexpected messages received; a defined and recognized message is received that is not expected in the current state.		15, 60, 24
M3UA: RxVersionErr	Number of messages that are received with an invalid version.		15, 60, 24
NUP-GROUP	National User Part Statistics	SS7 Signaling Service	
NUP: RCV MSG TOT	Total number of messages that are received		5, 30
NUP: UNEX MSG TOT	Number of unexpected messages received		5, 30
NUP: XMIT MSG TOT	Total number of messages that are transmitted		5, 30
OVL-GROUP	Overload Statistics	Cisco PGW 2200 Softswitch Network Element	
OVL: LVL1 Duration	Number of minutes in level 1 overload condition		15, 60, 24
OVL: LVL2 Duration	Number of minutes in level 2 overload condition		15, 60, 24
OVL: LVL3 Duration	Number of minutes in level 3 overload condition		15, 60, 24
OVL: LVL0 Duration	Number of minutes in level 0 overload condition		15, 60, 24
OVL: LVL0-LVL1 TOT	Number of transitions from level 0 to level 1 overload condition		15, 60, 24
OVL: LVL0-LVL2 TOT	Number of transitions from level 0 to level 2 overload condition		15, 60, 24
OVL: LVL0-LVL3 TOT	Number of transitions from level 0 to level 3 overload condition		15, 60, 24
PRI-GROUP	ISDN PRI Link statistics	IPFAS Signaling Service	
PRI: CHAN MATE UNAVAILABLE	Number of times ISDN PRI link channel mate unavailable		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SC-GROUP	Signaling link statistics	SS7 Link	
SC: RCV BAD CRC	Number of bad CRCs received		15, 60, 24
SC: RCV BAD TOT	Total number of bad frames received		15, 60, 24
SC: RCV FRMR	Number of bad FRMRs received		15, 60, 24
SC: RCV FRM TOT	Total number of frames received		15, 60, 24
SC: RCV RESET	Number of RESETs received		15, 60, 24
SC: XMIT FRM TOT	Total number of frames transmitted		15, 60, 24
SCCP-GROUP	Signaling Connection Control Part statistics	Cisco PGW 2200 Softswitch Network Element	
SCCP: ROUTING FAILURE	Total number of routing failures		5, 30
SCCP: TOTAL MSG	Total number of messages processed		5, 30
SCCP: UDT RCV	Number of unit data messages received		5, 30
SCCP: UDTS RCV	Number of unit data service messages received		5, 30
SCCP: UDTS XMIT	Number of unit data service messages transmitted		5, 30
SCCP: UDT XMIT	Number of unit data messages transmitted		5, 30
SCTP-GROUP	SCTP traffic statistics	Association	
SCTP: AssocFailures	Added in Release 9.6. Number of association failures.		15, 60, 24
SCTP: CtrlRx	Added in Release 9.6. Number of control chunks received.		15, 60, 24
SCTP: CtrlTx	Added in Release 9.6. Number of control chunks sent.		15, 60, 24
SCTP: DataSegTx	Added in Release 9.6. Number of SCTP data segments sent.		15, 60, 24
SCTP: DataSegRx	Added in Release 9.6. Number of SCTP data segments received.		15, 60, 24
SCTP: DestFailures	Added in Release 9.6. Number of destination failures.		15, 60, 24
SCTP: InvalidChksum	Added in Release 9.6. Number of checksum error packets received.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SCTP: OOTB	Added in Release 9.6. Number of out of the blue packets received.		15, 60, 24
SCTP: OrdDataRx	Added in Release 9.6. Number of ordered data chunks received.		15, 60, 24
SCTP: OrdDataTx	Added in Release 9.6. Number of ordered data chunks sent.		15, 60, 24
SCTP: PeerRestarted	Added in Release 9.6. Number of times the peer restarted.		15, 60, 24
SCTP: UnordDataRx	Added in Release 9.6. Number of unordered data chunks received.		15, 60, 24
SCTP: UnordDataTx	Added in Release 9.6. Number of unordered data chunks sent.		15, 60, 24
SIP-GROUP	SIP traffic statistics	Cisco PGW 2200 Softswitch Network Element	
SIP: RCV 100 TOT	Number of TRYING messages received		30
SIP: RCV 180 TOT	Number of RINGING messages received		30
SIP: RCV 181 TOT	Number of CALL IS BEING FORWARDED messages received		30
SIP: RCV 182 TOT	Number of QUEUED messages received		30
SIP: RCV 183 TOT	Number of SESSION PROGRESS messages received		30
SIP: RCV 200 TOT	Number of OK messages received		30
SIP-GROUP (continued)	SIP traffic statistics	Cisco PGW 2200 Softswitch Network Element	
SIP: RCV 300 TOT	Number of MULTIPLE CHOICES messages received		30
SIP: RCV 301 TOT	Number of MOVED PERMANENTLY messages received		30
SIP: RCV 302 TOT	Number of MOVED TEMPORARILY messages received		30
SIP: RCV 305 TOT	Number of USE PROXY messages received		30
SIP: RCV 380 TOT	Number of ALTERNATIVE SERVICE messages received		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIP: RCV 400 TOT	Number of BAD REQUEST messages received		30
SIP: RCV 401 TOT	Number of UNAUTHORIZED messages received		30
SIP: RCV 402 TOT	Number of PAYMENT REQUIRED messages received		30
SIP: RCV 403 TOT	Number of FORBIDDEN messages received		30
SIP: RCV 404 TOT	Number of NOT FOUND messages received		30
SIP: RCV 405 TOT	Number of METHOD NOT ALLOWED messages received		30
SIP: RCV 406 TOT	Number of NOT ACCEPTABLE messages received		30
SIP: RCV 407 TOT	Number of PROXY AUTHENTICATION REQUIRED messages received		30
SIP: RCV 408 TOT	Number of REQUEST TIMEOUT messages received		30
SIP: RCV 409 TOT	Number of CONFLICT messages received		30
SIP: RCV 410 TOT	Number of GONE messages received		30
SIP: RCV 411 TOT	Number of LENGTH REQUIRED messages received		30
SIP: RCV 413 TOT	Number of REQUEST ENTITY TOO LARGE messages received		30
SIP: RCV 414 TOT	Number of REQUEST-URI TOO LONG messages received		30
SIP-GROUP (continued)	SIP traffic statistics (continued)	Cisco PGW 2200 Softswitch Network Element	
SIP: RCV 415 TOT	Number of UNSUPPORTED MEDIA TYPE messages received		30
SIP: RCV 420 TOT	Number of BAD EXTENSION messages received		30
SIP: RCV 480 TOT	Number of TEMPORARILY NOT AVAILABLE messages received		30
SIP: RCV 481 TOT	Number of CALL LEG/ TRANSACTION DOES NOT EXIST messages received		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIP: RCV 482 TOT	Number of LOOP DETECTED messages received		30
SIP: RCV 483 TOT	Number of TOO MANY HOPS messages received		30
SIP: RCV 484 TOT	Number of ADDRESS INCOMPLETE messages received		30
SIP: RCV 485 TOT	Number of AMBIGUOUS messages received		30
SIP: RCV 486 TOT	Number of BUSY HERE messages received		30
SIP: RCV 487 TOT	Number of REQUEST CANCELLED messages received		30
SIP: RCV 500 TOT	Number of INTERNAL SERVER ERROR messages transmitted		30
SIP: RCV 501 TOT	Number of NOT IMPLEMENTED messages received		30
SIP: RCV 502 TOT	Number of BAD GATEWAY messages received		30
SIP: RCV 503 TOT	Number of SERVICE UNAVAILABLE messages received		30
SIP: RCV 504 TOT	Number of GATEWAY TIMEOUT messages received		30
SIP: RCV 505 TOT	Number of SIP VERSION NOT SUPPORTED messages received		30
SIP: RCV 600 TOT	Number of BUSY EVERYWHERE messages received		30
SIP: RCV 603 TOT	Number of DECLINE messages received		30
SIP: RCV 604 TOT	Number of DOES NOT EXIST ANYWHERE messages received		30
SIP: RCV 606 TOT	Number of NOT ACCEPTABLE messages received		30
SIP: RCV ACK TOT	Number of Acknowledgement (ACK) messages received		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIP-GROUP (continued)	SIP traffic statistics (continued)	Cisco PGW 2200 Softswitch Network Element	
SIP: RCV BYE TOT	Number of BYE messages received		30
SIP: RCV CAN TOT	Number of CANCEL messages received		30
SIP: RCV INVALID MSG TOT	Number of invalid messages received		30
SIP: RCV INV TOT	Number of INVITE messages received		30
SIP: RCV MSG TOT	Number of messages received		30
SIP: RCV OPT TOT	Number of OPTION messages received		30
SIP: RCV PRACK TOT	Number of PRACK messages received		30
SIP: RCV REG TOT	Number of REGISTER messages received		30
SIP: RETX BYE TOT	Number of BYE messages retransmitted		30
SIP: RETX CAN TOT	Number of CANCEL messages retransmitted		30
SIP: RETX INV TOT	Number of INVITE messages retransmitted		30
SIP: RETX MSG TOT	Number of retransmitted messages		30
SIP: RETX PRACK TOT	Number of PRACK messages retransmitted		30
SIP: RETX REG TOT	Number of REGISTER messages retransmitted		30
SIP: RETX RESP TOT	Number of RESPONSE messages retransmitted		30
SIP: SIP2SIP CALLS ATTEMPT	Number of SIP to SIP calls that are attempted		30
SIP: SIP2SIP CALLS COMPL	Number of SIP to SIP calls that are completed		30
SIP: XMIT 100 TOT	Number of TRYING messages transmitted		30
SIP: XMIT 180 TOT	Number of RINGING messages transmitted		30
SIP: XMIT 181 TOT	Number of CALL IS BEING FORWARDED messages transmitted		30
SIP: XMIT 182 TOT	Number of QUEUED messages transmitted		30
SIP: XMIT 183 TOT	Number of SESSION PROGRESS messages transmitted		30
SIP: XMIT 200 TOT	Number of OK messages transmitted		30
SIP: XMIT 300 TOT	Number of MULTIPLE CHOICES messages transmitted		30
SIP: XMIT 301 TOT	Number of MOVED PERMANENTLY messages transmitted		30
SIP: XMIT 302 TOT	Number of MOVED TEMPORARILY messages transmitted		30
SIP: XMIT 305 TOT	Number of USE PROXY messages transmitted		30
SIP: XMIT 380 TOT	Number of ALTERNATIVE SERVICE messages transmitted		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIP-GROUP (continued)	SIP traffic statistics (continued)	Cisco PGW 2200 Softswitch Network Element	
SIP: XMIT 400 TOT	Number of BAD REQUEST messages transmitted		30
SIP: XMIT 401 TOT	Number of UNAUTHORIZED messages transmitted		30
SIP: XMIT 402 TOT	Number of PAYMENT REQUIRED messages transmitted		30
SIP: XMIT 403 TOT	Number of FORBIDDEN messages transmitted		30
SIP: XMIT 404 TOT	Number of NOT FOUND messages transmitted		30
SIP: XMIT 405 TOT	Number of METHOD NOT ALLOWED messages transmitted		30
SIP: XMIT 406 TOT	Number of NOT ACCEPTABLE messages transmitted		30
SIP: XMIT 407 TOT	Number of PROXY AUTHENTICATION REQUIRED messages transmitted		30
SIP: XMIT 408 TOT	Number of REQUEST TIMEOUT messages transmitted		30
SIP: XMIT 409 TOT	Number of CONFLICT messages transmitted		30
SIP: XMIT 410 TOT	Number of GONE messages transmitted		30
SIP: XMIT 411 TOT	Number of LENGTH REQUIRED messages transmitted		30
SIP: XMIT 413 TOT	Number of REQUEST ENTITY TOO LARGE messages transmitted		30
SIP: XMIT 414 TOT	Number of REQUEST-URI TOO LONG messages transmitted		30
SIP: XMIT 415 TOT	Number of UNSUPPORTED MEDIA TYPE messages transmitted		30
SIP: XMIT 420 TOT	Number of BAD EXTENSION messages transmitted		30
SIP: XMIT 480 TOT	Number of TEMPORARILY NOT AVAILABLE messages transmitted		30
SIP: XMIT 481 TOT	Number of CALL LEG/ TRANSACTION DOES NOT EXIST messages transmitted		30
SIP: XMIT 482 TOT	Number of LOOP DETECTED messages transmitted		30
SIP: XMIT 483 TOT	Number of TOO MANY HOPS messages transmitted		30
SIP: XMIT 484 TOT	Number of ADDRESS INCOMPLETE messages transmitted		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIP-GROUP (continued)	SIP traffic statistics (continued)	Cisco PGW 2200 Softswitch Network Element	
SIP: XMIT 485 TOT	Number of AMBIGUOUS messages transmitted		30
SIP: XMIT 486 TOT	Number of BUSY HERE messages transmitted		30
SIP: XMIT 487 TOT	Number of REQUEST CANCELLED messages transmitted		30
SIP: XMIT 500 TOT	Number of INTERNAL SERVER ERROR messages transmitted		30
SIP: XMIT 501 TOT	Number of NOT IMPLEMENTED messages transmitted		30
SIP: XMIT 502 TOT	Number of BAD GATEWAY messages transmitted		30
SIP: XMIT 503 TOT	Number of SERVICE UNAVAILABLE messages transmitted		30
SIP: XMIT 504 TOT	Number of GATEWAY TIMEOUT messages transmitted		30
SIP: XMIT 505 TOT	Number of SIP VERSION NOT SUPPORTED messages transmitted		30
SIP: XMIT 600 TOT	Number of BUSY EVERYWHERE messages transmitted		30
SIP: XMIT 603 TOT	Number of DECLINE messages transmitted		30
SIP: XMIT 604 TOT	Number of DOES NOT EXIST ANYWHERE messages transmitted		30
SIP: XMIT 606 TOT	Number of NOT ACCEPTABLE messages transmitted		30
SIP: XMIT ACK TOT	Number of Acknowledgement messages transmitted		30
SIP: XMIT BYE TOT	Number of BYE messages transmitted		30
SIP: XMIT CAN TOT	Number of CANCEL messages transmitted		30
SIP: XMIT INV TOT	Number of INVITE messages transmitted		30
SIP: XMIT MSG TOT	Number of messages transmitted		30
SIP: XMIT OPT TOT	Number of OPTION messages transmitted		30
SIP: XMIT PRACK TOT	Number of PRACK messages transmitted		30
SIP: XMIT REG TOT	Number of REGISTER messages transmitted		30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SIPSP-GROUP	SIP sigpath statistics	SIP Sigpath	
SIPSP: BAD URL TOT	Number of unresolved URLs		30
SIPSP: DNS CACHE NEW TOT	Number of new entries in the DNS cache		30
SIPSP: DNS CACHE PURGE TOT	Number of entries that are purged from the DNS cache		30
SIPSP: DNS CACHE REFRESHED TOT			30
SIPSP: DNS QUERY TOT	Number of entries that are refreshed in the DNS cache		30
SIPSP: DNS TIMEOUT TOT			30
SIPSP: ICMP ERR TOT	Number of DNS queries		30
SIPSP: RCV FAIL TOT	Number of DNS timeouts		30
SIPSP: RCV MSG TOT	Number of ICMP errors		30
SIPSP: RCV TCP MSG TOT	Number of UDP received failed		30
SIPSP: RCV UDP MSG TOT	Number of messages received		30
SIPSP: XMIT FAIL TOT	Added in Release 9.8. The total number of messages that are received though TCP.		30
SIPSP: XMIT MSG TOT	Added in Release 9.8. The total number of messages that are received through UDP.		30
SIPSP: XMIT TCP MSG TOT	Number of UDP transmitted failed		30
SIPSP: XMIT UDP MSG TOT	Number of messages transmitted		30
	Added in Release 9.8. The total number of messages that are sent through TCP.		30
	Added in Release 9.8. The total number of messages sent using UDP.		
SP-GROUP	Signaling service statistics	Signaling Services:	
SP: Blacklist Call Ctr	Number of blacklist calls counter	SS7, EISUP, IPFAS, MGCP	15, 60, 24
SP: CBReqExpired	Added in Release 9.6. This counter is incremented each time a Call Back request from the Cisco CallManager expires from its time to live value.		15, 60, 24
SP: cInit in	Number of call init messages received		15, 60, 24
SP: cInit out	Number of call init messages sent		15, 60, 24
SP: COT Failure	Number of COT failures		15, 60, 24
SP: IPIN REJ TOT	Added in Release 9.7. Total number of rejected calls due to IPIN screening	SIP path/EISUP path	15, 60, 24
SP: PDU in	Number of messages received		15, 60, 24
SP: PDU out	Number of messages sent		15, 60, 24

Note The SP: Blacklist Call Ctr and SP: COT Failure measurements are not currently supported.

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
STATE-GROUP	User Defined Statistics	Cisco PGW 2200 Softswitch Network Element	
STATE: CDB ReCord Xmit	Number of CDBs transmitted		15, 60, 24
STATE: User Count1	User-defined count 1		15, 60, 24
STATE: User Count2	User-defined count 2		15, 60, 24
STATE: User Count3	User-defined count 3		15, 60, 24
STATE: User Count4	User-defined count 4		15, 60, 24
STATE: User Count5	User-defined count 5		15, 60, 24
STATE: User Count6	User-defined count 6		15, 60, 24
STATE: User Count7	User-defined count 7		15, 60, 24
STATE: User Count8	User-defined count 8		15, 60, 24
STATE: User Count 9	User-defined count 9		15, 60, 24
STATE: User Count10	User-defined count 10		15, 60, 24
STATE: User Count11	User-defined count 11		15, 60, 24
STATE: User Count12	User-defined count 12		15, 60, 24
STATE: User Count13	User-defined count 13		15, 60, 24
STATE: User Count14	User-defined count 14		15, 60, 24
STATE: User Count15	User-defined count 15		15, 60, 24
STATE: User Count16	User-defined count 16		15, 60, 24
STATE: User Count17	User-defined count 17		15, 60, 24
STATE: User Count18	User-defined count 18		15, 60, 24
STATE: User Count19	User-defined count 19		15, 60, 24
STATE: User Count20	User-defined count 20		15, 60, 24
STATE: User Count21	User-defined count 21		15, 60, 24
STATE: User Count22	User-defined count 22		15, 60, 24
STATE: User Count23	User-defined count 23		15, 60, 24
STATE: User Count24	User-defined count 24		15, 60, 24
STATE: User Count25	User-defined count 25		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SUA GROUP	SUA message statistics	Association	
SUA: AspActAckRx	Number of ASP ACTIVE ACK messages received		15, 60, 24
SUA: ASPActTx	Number of ASP ACTIVE messages transmitted		15, 60, 24
SUA: ASPDnAckRx	Number of ASP DOWN acknowledge messages received		15, 60, 24
SUA: ASPDnTx	Number of ASP DOWN messages transmitted		15, 60, 24
SUA: AspInactAckRx	Number of ASP INACTIVE ACK messages received		15, 60, 24
SUA: ASPInactTx	Number of ASP INACTIVE messages transmitted		15, 60, 24
SUA: ASPUpTx	Number of ASP UP messages transmitted		15, 60, 24
SUA: ASPUpAckRx	Number of ASP UP acknowledgments received		15, 60, 24
SUA: AssocFail	Number of SCTP association failures		15, 60, 24
SUA: AssocTxFail	Number of transmit SCTP failures		15, 60, 24
SUA: CldtTx	Number of Connectionless Data Transfers sent		15, 60, 24
SUA: CldrRx	Number of Connectionless Data Responses received		15, 60, 24
SUA: DataBytesTx	Number of SUA data bytes transmitted		15, 60, 24
SUA: DataBytesRx	Number of SUA data bytes received		15, 60, 24
SUA: DaudTx	Number of DAUD messages transmitted		15, 60, 24
SUA: DavaRx	Number of DAVA messages received		15, 60, 24
SUA: DrstRx	Number of DRST messages received		15, 60, 24
SUA: DunaRx	Number of DUNA messages received		15, 60, 24
SUA: DupuRx	Number of DUPU messages transmitted		15, 60, 24
SUA: ErrorRx	Number of error messages received		15, 60, 24
SUA: ErrorTx	Number of error messages transmitted		15, 60, 24
SUA: InvSctpSig	Number of invalid SCTP signals that SUA received		15, 60, 24
SUA: NotifyRx	Number of notify messages received		15, 60, 24
SUA: NotifyTx	Number of notify messages transmitted		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
SUA GROUP (continued)	SUA message statistics	Association	
SUA: RouteCntxErr	Number of messages that are received with an invalid (unconfigured) Routing Context.		15, 60, 24
SUA: RxMsgClassErr	Number of received messages with an unexpected or unsupported Message Class.		15, 60, 24
SUA: RxMsgLenErr	Number of messages that are received with length error.		15, 60, 24
SUA: RxMsgTypeErr	Number of messages that are received with an unexpected or unsupported Message Type.		15, 60, 24
SUA: RxNoMemErr	Number of messages that were dumped because memory ran out (buffer overflow).		15, 60, 24
SUA: RxNtwkAppErr	Number of messages that are received with an invalid (unconfigured) Network Appearance.		15, 60, 24
SUA: RxParmValErr	Number of messages that are received with parameter value errors.		15, 60, 24
SUA: RxParmFieldErr	Number of messages that are received with a parameter having a wrong length field.		15, 60, 24
SUA: RxProtErr	Number of messages that are received with protocol errors, for any protocol anomaly (that is, reception of a parameter that is syntactically correct but unexpected in the current state).		15, 60, 24
SUA: RxStrmIdErr	Number of messages that are received with stream ID error. This error occurs when a message is received on an unexpected SCTP stream (that is, a Management message was received on a stream other than “0”).		15, 60, 24
SUA: RxUnexpMsgErr	Number of unexpected messages that are received. A defined and recognized message is received that is not expected in the current state.		15, 60, 24
SUA: RxUnexpParmErr	Number of messages received that contain one or more invalid parameters.		15, 60, 24
SUA: RxVersionErr	Number of messages that are received with an invalid version.		15, 60, 24
SUA: SconRx	Number of SCON messages received.		15, 60, 24

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TCAP-GROUP	Transaction Capabilities Application Part statistics	Cisco PGW 2200 Softswitch Network Element	
TCAP: ABT RCV	Number of Abort messages received		5, 30
TCAP: ABT XMIT	Number of Abort messages transmitted		5, 30
TCAP: BEGIN RCV	Number of Begin messages received. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: BEGIN XMIT	Number of Begin messages transmitted. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: CONTINUE RCV	Number of Continue messages received. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: CONTINUE XMIT	Number of Continue messages transmitted. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: CONV RCV	Number of Conversation messages received. This measurement is valid only for ANSI TCAP.		5, 30
TCAP: CONV XMIT	Number of Conversation messages transmitted. This measurement is valid only for ANSI TCAP.		5, 30
TCAP: END RCV	Number of End messages received. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: END XMIT	Number of End messages transmitted. This measurement is valid only for ETSI and ITU TCAP.		5, 30
TCAP: MSG DROP	Number of messages dropped		5, 30
TCAP: MSG RCV	Total number of messages received		5, 30
TCAP: MSG UNREC	Number of unrecognized messages received		5, 30
TCAP: MSG XMIT	Total number of messages transmitted		5, 30
TCAP: QWP RCV	Number of Query with permission messages received		5, 30
TCAP: QWP XMIT	Number of Query with permission messages transmitted		5, 30
TCAP: RSP RCV	Number of Response messages received		5, 30
TCAP: RSP XMIT	Number of Response messages transmitted		5, 30
TCAP: UNI RCV	Number of Unidirectional messages received		5, 30
TCAP: UNI XMIT	Number of Unidirectional messages transmitted		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TUP-GROUP	Telephone User Part statistics	SS7 Signaling Service	
TUP: ABN REL TOT	Number of abnormal clear messages received		5, 30
TUP: CHAN MATE UNAVILABLE	Number of Channel Mate Unavailable messages received		5, 30
TUP: RCV ACB TOT	Number of ACB messages received		5, 30
TUP: RCV ACC TOT	Number of ACC messages received		5, 30
TUP: RCV ACF TOT	Number of ACF messages received		5, 30
TUP: RCV ACM TOT	Number of ACM messages received		5, 30
TUP: RCV ADI TOT	Number of ADI messages transmitted		5, 30
TUP: RCV ANC TOT	Number of ANC messages received		5, 30
TUP: RCV ANN TOT	Number of ANN messages received		5, 30
TUP: RCV ANU TOT	Number of ANU messages received		5, 30
TUP: RCV AUU TOT	Number of AUU messages received		5, 30
TUP: RCV BLA TOT	Number of BLA messages received		5, 30
TUP: RCV BLO TOT	Number of BLO messages received		5, 30
TUP: RCV CBK TOT	Number of CBK messages received		5, 30
TUP: RCV CBU TOT	Number of CBU messages received		5, 30
TUP: RCV CCF TOT	Number of CCF messages received		5, 30
TUP: RCV CCL TOT	Number of CCL messages received		5, 30
TUP: RCV CCR TOT	Number of CCR messages received		5, 30
TUP: RCV CFL TOT	Number of CFL messages received		5, 30
TUP: RCV CGC TOT	Number of CGC messages received		5, 30
TUP: RCV CHA TOT	Number of CHA messages received		5, 30
TUP: RCV CHG TOT	Number of CHG messages received		5, 30
TUP: RCV CHP TOT	Number of CHP messages received		5, 30
TUP: RCV CHT TOT	Number of CHT messages received		5, 30
TUP: RCV CLF TOT	Number of CLF messages received		5, 30
TUP: RCV CLU TOT	Number of CLU messages received		5, 30
TUP: RCV COT TOT	Number of COT messages received		5, 30
TUP: RCV DPN TOT	Number of DPN messages received		5, 30
TUP: RCV EUM TOT	Number of EUM messages received		5, 30
TUP: RCV FOT TOT	Number of FOT messages received		5, 30
TUP: RCV GRA TOT	Number of GRA messages received		5, 30
TUP: RCV GRQ TOT	Number of GRQ messages received		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TUP-GROUP (continued)	Telephone User Part statistics (continued)	SS7 Signaling Service	
TUP: RCV GRS TOT	Number of GRS messages received		5, 30
TUP: RCV GSE TOT	Number of GSE messages received		5, 30
TUP: RCV GSM TOT	Number of GSM messages received		5, 30
TUP: RCV HBA TOT	Number of HBA messages received		5, 30
TUP: RCV HGB TOT	Number of HGB messages received		5, 30
TUP: RCV HGU TOT	Number of HGU messages received		5, 30
TUP: RCV HUA TOT	Number of HUA messages received		5, 30
TUP: RCV IAF TOT	Number of IAF messages received		5, 30
TUP: RCV IAI TOT	Number of IAI messages received		5, 30
TUP: RCV IAM TOT	Number of IAM messages received		5, 30
TUP: RCV ICF TOT	Number of ICF messages received		5, 30
TUP: RCV LOS TOT	Number of LOS messages received		5, 30
TUP: RCV MAL TOT	Number of MAL messages received		5, 30
TUP: RCV MBA TOT	Number of MBA messages received		5, 30
TUP: RCV MGB TOT	Number of MGB messages received		5, 30
TUP: RCV MGU TOT	Number of MGU messages received		5, 30
TUP: RCV MPM TOT	Number of MPM messages received		5, 30
TUP: RCV MPR TOT	Number of MPR messages received		5, 30
TUP: RCV MSG TOT	Total number of messages that are received		5, 30
TUP: RCV MUA TOT	Number of MUA messages received		5, 30
TUP: RCV NNC TOT	Number of NNC messages received		5, 30
TUP: RCV OPR TOT	Number of OPR messages received		5, 30
TUP: RCV RAN TOT	Number of RAN messages received		5, 30
TUP: RCV RLG TOT	Number of RLG messages received		5, 30
TUP: RCV RSC TOT	Number of RSC messages received		5, 30
TUP: RCV SAM TOT	Number of SAM messages received		5, 30
TUP: RCV SAO TOT	Number of SAO messages received		5, 30
TUP: RCV SBA TOT	Number of SBA messages received		5, 30
TUP: RCV SEC TOT	Number of SEC messages received		5, 30
TUP: RCV SGB TOT	Number of SGB messages received		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TUP-GROUP (continued)	Telephone User Part statistics (continued)	SS7 Signaling Service	
TUP: RCV SGU TOT	Number of SGU messages received		5, 30
TUP: RCV SLB TOT	Number of SLB messages received		5, 30
TUP: RCV SNA TOT	Number of SNA messages received		5, 30
TUP: RCV SSB TOT	Number of SSB messages received		5, 30
TUP: RCV SST TOT	Number of SST messages received		5, 30
TUP: RCV STB TOT	Number of STB messages received		5, 30
TUP: RCV SUA TOT	Number of SUA messages received		5, 30
TUP: RCV UBA TOT	Number of UBA messages received		5, 30
TUP: RCV UBL TOT	Number of UBL messages received		5, 30
TUP: RCV UNN TOT	Number of UNN messages received		5, 30
TUP: UNEX MSG TOT	Number of unexpected messages received		5, 30
TUP: UNREC MSG TOT	Number of unrecognized messages received		5, 30
TUP: XMIT ACB TOT	Number of ACB messages transmitted		5, 30
TUP: XMIT ACC TOT	Number of ACC messages transmitted		5, 30
TUP: XMIT ACF TOT	Number of ACF messages transmitted		5, 30
TUP: XMIT ACM TOT	Number of ACM messages transmitted		5, 30
TUP: XMIT ADI TOT	Number of ADI messages transmitted		5, 30
TUP: XMIT ANC TOT	Number of ANC messages transmitted		5, 30
TUP: XMIT ANN TOT	Number of ANN messages transmitted		5, 30
TUP: XMIT ANU TOT	Number of ANU messages transmitted		5, 30
TUP: XMIT AUU TOT	Number of AUU messages transmitted		5, 30
TUP: XMIT BLA TOT	Number of BLA messages transmitted		5, 30
TUP: XMIT BLO TOT	Number of BLO messages transmitted		5, 30
TUP: XMIT CBK TOT	Number of CBK messages transmitted		5, 30
TUP: XMIT CBU TOT	Number of CBU messages transmitted		5, 30
TUP: XMIT CCF TOT	Number of CCF messages transmitted		5, 30
TUP: XMIT CCL TOT	Number of CCL messages transmitted		5, 30
TUP: XMIT CCR TOT	Number of CCR messages transmitted		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TUP-GROUP (continued)	Telephone User Part statistics (continued)	SS7 Signaling Service	
TUP: XMIT CFL TOT	Number of CFL messages transmitted		5, 30
TUP: XMIT CGC TOT	Number of CGC messages transmitted		5, 30
TUP: XMIT CHA TOT	Number of CHA messages transmitted		5, 30
TUP: XMIT CHG TOT	Number of CHG messages transmitted		5, 30
TUP: XMIT CHP TOT	Number of CHP messages transmitted		5, 30
TUP: XMIT CHT TOT	Number of CHT messages transmitted		5, 30
TUP: XMIT CLF TOT	Number of CLF messages transmitted		5, 30
TUP: XMIT CLU TOT	Number of CLU messages transmitted		5, 30
TUP: XMIT COT TOT	Number of COT messages transmitted		5, 30
TUP: XMIT DPN TOT	Number of DPN messages transmitted		5, 30
TUP: XMIT EUM TOT	Number of EUM messages transmitted		5, 30
TUP: XMIT FOT TOT	Number of FOT messages transmitted		5, 30
TUP: XMIT GRA TOT	Number of GRA messages transmitted		5, 30
TUP: XMIT GRQ TOT	Number of GRQ messages transmitted		5, 30
TUP: XMIT GRS TOT	Number of GRS messages transmitted		5, 30
TUP: XMIT GSE TOT	Number of GSE messages transmitted		5, 30
TUP: XMIT GSM TOT	Number of GSM messages transmitted		5, 30
TUP: XMIT HBA TOT	Number of HBA messages transmitted		5, 30
TUP: XMIT HGB TOT	Number of HGB messages transmitted		5, 30
TUP: XMIT HGU TOT	Number of HGU messages transmitted		5, 30
TUP: XMIT HUA TOT	Number of HUA messages transmitted		5, 30
TUP: XMIT IAF TOT	Number of IAF messages transmitted		5, 30
TUP: XMIT IAI TOT	Number of IAI messages transmitted		5, 30
TUP: XMIT IAM TOT	Number of IAM messages transmitted		5, 30
TUP: XMIT ICF TOT	Number of ICF messages transmitted		5, 30
TUP: XMIT LOS TOT	Number of LOS messages transmitted		5, 30
TUP: XMIT MAL TOT	Number of MAL messages transmitted		5, 30
TUP: XMIT MBA TOT	Number of MBA messages transmitted		5, 30
TUP: XMIT MGB TOT	Number of MGB messages transmitted		5, 30
TUP: XMIT MGU TOT	Number of MGU messages transmitted		5, 30
TUP: XMIT MPM TOT	Number of MPM messages transmitted		5, 30
TUP: XMIT MPR TOT	Number of MPR messages transmitted		5, 30
TUP: XMIT MSG TOT	Total number of messages that are transmitted		5, 30

Table D-1 Operational Measurements Supported (continued)

MML Counter Group:Name	Description	Related Components	Logging Interval
TUP-GROUP (continued)	Telephone User Part statistics (continued)	SS7 Signaling Service	
TUP: XMIT MUA TOT	Number of MUA messages transmitted		5, 30
TUP: XMIT NNC TOT	Number of NNC messages transmitted		5, 30
TUP: XMIT OPR TOT	Number of OPR messages transmitted		5, 30
TUP: XMIT RAN TOT	Number of RAN messages transmitted		5, 30
TUP: XMIT RLG TOT	Number of RLG messages transmitted		5, 30
TUP: XMIT RSC TOT	Number of RSC messages transmitted		5, 30
TUP: XMIT SAM TOT	Number of SAM messages transmitted		5, 30
TUP: XMIT SAO TOT	Number of SAO messages transmitted		5, 30
TUP: XMIT SBA TOT	Number of SBA messages transmitted		5, 30
TUP: XMIT SEC TOT	Number of SEC messages transmitted		5, 30
TUP: XMIT SGB TOT	Number of SGB messages transmitted		5, 30
TUP: XMIT SGU TOT	Number of SGU messages transmitted		5, 30
TUP: XMIT SLB TOT	Number of SLB messages transmitted		5, 30
TUP: XMIT SNA TOT	Number of SNA messages transmitted		5, 30
TUP: XMIT SSB TOT	Number of SSB messages transmitted		5, 30
TUP: XMIT SST TOT	Number of SST messages transmitted		5, 30
TUP: XMIT STB TOT	Number of STB messages transmitted		5, 30
TUP: XMIT SUA TOT	Number of SUA messages transmitted		5, 30
TUP: XMIT UBA TOT	Number of UBA messages transmitted		5, 30
TUP: XMIT UBL TOT	Number of UBL messages transmitted		5, 30
TUP: XMIT UNN TOT	Number of UNN messages transmitted		5, 30

ANSI ISUP Measurements

Table D-2 lists the ANSI ISUP measurements that the Cisco PGW 2200 Softswitch can generate.

Table D-2 ANSI ISUP Measurements

ANSI Measurement Name	MML Counter Group:Name	Description
CountAbnormalReleases	ISUP: ABN REL TOT	Number of instances when release messages did not clear normally
CountMatedChanUnavailable	ISUP: CHAN MATE UNAVAILABLE	Number of instances when the B mate was not available
CountReceivedACM	ISUP: RCV ACM TOT	Number of ACM messages sent
CountReceivedANM	ISUP: RCV ANM TOT	Number of ANM messages sent
CountReceivedBLA	ISUP: RCV BLA TOT	Number of BLA messages sent
CountReceivedBLO	ISUP: RCV BLO TOT	Number of BLO messages sent
CountReceivedCCR	ISUP: RCV CCR TOT	Number of CCR messages sent
CountReceivedCFN	ISUP: RCV CFN TOT	Number of CFN messages sent
CountReceivedCGB	ISUP: RCV CGB TOT	Number of CGB messages sent
CountReceivedCGBA	ISUP: RCV CGBA TOT	Number of CGBA messages sent
CountReceivedCGU	ISUP: RCV CGU TOT	Number of CGU messages sent
CountReceivedCGUA	ISUP: RCV CGUA TOT	Number of CGUA messages sent
CountReceivedCOT	ISUP: RCV COT TOT	Number of COT messages sent
CountReceivedCPG	ISUP: RCV CPG TOT	Number of CPG messages sent
CountReceivedCQM	ISUP: RCV CQM TOT	Number of CQM messages sent
CountReceivedCQR	ISUP: RCV CQR TOT	Number of CQR messages sent
CountReceivedCRA	ISUP: RCV CRA TOT	Number of CRA messages sent
CountReceivedCRM	ISUP: RCV CRM TOT	Number of CRM messages sent
CountReceivedCVR	ISUP: RCV CVR TOT	Number of CVR messages sent
CountReceivedCVT	ISUP: RCV CVT TOT	Number of CVT messages sent
CountReceivedEXM	ISUP: RCV EXM TOT	Number of EXM messages sent
CountReceivedFAC	ISUP: RCV FAC TOT	Number of FAC messages sent
CountReceivedFOT	ISUP: RCV FOT TOT	Number of FOT messages sent
CountReceivedGRA	ISUP: RCV GRA TOT	Number of GRA messages sent
CountReceivedGRS	ISUP: RCV GRS TOT	Number of GRS messages sent
CountReceivedIAM	ISUP: RCV IAM TOT	Number of IAM messages sent
CountReceivedINF	ISUP: RCV INF TOT	Number of INF messages sent
CountReceivedINR	ISUP: RCV INR TOT	Number of INR messages sent
CountReceivedLPA	ISUP: RCV LPA TOT	Number of LPA messages sent
CountReceivedMessages	ISUP: RCV MSG TOT	Total number of messages received
CountReceivedPAM	ISUP: RCV PAM TOT	Number of PAM messages sent

Table D-2 ANSI ISUP Measurements

ANSI Measurement Name	MML Counter Group:Name	Description
CountReceivedREL	ISUP: RCV REL TOT	Number of REL messages sent
CountReceivedRES	ISUP: RCV RES TOT	Number of RES messages sent
CountReceivedRLC	ISUP: RCV RLC TOT	Number of RLC messages sent
CountReceivedRSC	ISUP: RCV RSC TOT	Number of RSC messages sent
CountReceivedSUS	ISUP: RCV SUS TOT	Number of SUS messages sent
CountReceivedUBA	ISUP: RCV UBA TOT	Number of UBA messages received
CountReceivedUBL	ISUP: RCV UBL TOT	Number of UBL messages sent
CountReceivedUCIC	ISUP: RCV UCIC TOT	Number of UCIC messages received
CountReceivedUSR	ISUP: RCV USR TOT	Number of USR messages received
CountSentACM	ISUP: XMIT ACM TOT	Number of Address Complete Messages (ACM) received
CountSentANM	ISUP: XMIT ANM TOT	Number of Answer Messages (ANM) received
CountSentBLA	ISUP: XMIT BLA TOT	Number of Blocking Acknowledgement (BLA) messages received
CountSentBLO	ISUP: XMIT BLO TOT	Number of Blocking (BLO) messages received
CountSentCCR	ISUP: XMIT CCR TOT	Number of Current Cell Rate (CCR) messages received
CountSentCFN	ISUP: XMIT CFN TOT	Number of Confusion (CFN) messages received
CountSentCGB	ISUP: XMIT CGB TOT	Number of Circuit Group Blocking (CGB) messages received
CountSentCGBA	ISUP: XMIT CGBA TOT	Number of Circuit Group Blocking Acknowledgement (CGBA) messages received
CountSentCGU	ISUP: XMIT CGU TOT	Number of Circuit Group Unblocking (CGU) messages received
CountSentCGUA	ISUP: XMIT CGUA TOT	Number of Circuit Group Unblocking Acknowledgement (CGUA) messages received
CountSentCOT	ISUP: XMIT COT TOT	Number of Continuity Check (COT) messages received
CountSentCPG	ISUP: XMIT CPG TOT	Number of Call Progress (CPG) messages received
CountSentCQM	ISUP: XMIT CQM TOT	Number of Circuit Group Query Messages (CQM) received
CountSentCQR	ISUP: XMIT CQR TOT	Number of Circuit Group Query Response (CQR) messages received
CountSentCRA	ISUP: XMIT CRA TOT	Number of Circuit Reservation Acknowledgement (CRA) messages received
CountSentCRM	ISUP: XMIT CRM TOT	Number of Cell Rate Margin (CRM) messages received
CountSentCVR	ISUP: XMIT CVR TOT	Number of Circuit Validation Response (CVR) messages received

Table D-2 ANSI ISUP Measurements

ANSI Measurement Name	MML Counter Group:Name	Description
CountSentCVT	ISUP: XMIT CVT TOT	Number of Circuit Validation Test (CVT) messages received
CountSentEXM	ISUP: XMIT EXM TOT	Number of Exit Messages (EXM) received
CountSentFAC	ISUP: XMIT FAC TOT	Number of Facility (FAC) messages received
CountSentFOT	ISUP: XMIT FOT TOT	Number of Forward Transfer (FOT) messages received
CountSentGRA	ISUP: XMIT GRA TOT	Number of Circuit Group Reset Acknowledgment (GRA) messages received
CountSentGRS	ISUP: XMIT GRS TOT	Number of Circuit Group Reset (GRS) messages received
CountSentIAM	ISUP: XMIT IAM TOT	Number of Initial Address Messages (IAM) received
CountSentINF	ISUP: XMIT INF TOT	Number of INF messages received
CountSentINR	ISUP: XMIT INR TOT	Number of INR messages received
CountSentLPA	ISUP: XMIT LPA TOT	Number of Loop Back Acknowledgement (LPA) messages received
CountSentMessages	ISUP: XMIT MSG TOT	Total number of messages sent
CountSentPAM	ISUP: XMIT PAM TOT	Number of Pass Along Messages (PAM) received
CountSentREL	ISUP: XMIT REL TOT	Number of Release (REL) messages received
CountSentRES	ISUP: XMIT RES TOT	Number of Resume (RES) messages received
CountSentRLC	ISUP: XMIT RLC TOT	Number of Release Complete (RLC) messages received
CountSentRSC	ISUP: XMIT RSC TOT	Number of Reset Circuit (RSC) messages received
CountSentSUS	ISUP: XMIT SUS TOT	Number of Suspend (SUS) messages received
CountSentUBA	ISUP: XMIT UBA TOT	Number of Unblocking Acknowledgement (UBA) messages received
CountSentUBL	ISUP: XMIT UBL TOT	Number of Unblocking (UBL) messages received
CountSentUCIC	ISUP: XMIT UCIC TOT	Number of Unequipped Carrier Identification Code (UCIC) messages sent
CountSentUSR	ISUP: XMIT USR TOT	Number of User-to-User Information (USR) messages sent
CountUnexpectedMsg	ISUP: UNEX MSG TOT	Total number of unexpected messages
CountUnrecognizedMsg	ISUP: UNREC MSG TOT	Total number of unrecognized messages

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